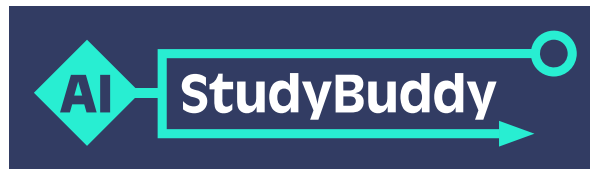


# *Design process documentation of the **Data** Reference Model*

*Joint research project AIStudyBuddy: AI based assistance to custom-fitted designing and reflection of study courses by students alias Study Buddy plus cross-university monitoring of study courses by study course designers alias Buddy Analytics.*

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# Design process documentation of the data reference model

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February 2025

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Project “AIStudyBuddy”

University service QSL – Quality in Studies and Teaching

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Design process documentation of the Data Reference Model  
Joint research project 'AIStudyBuddy'  
RWTH Aachen | RU Bochum | BU Wuppertal  
February 2025

University of Wuppertal, Gaußstr. 20, 42119 Wuppertal, Germany  
<https://aistuddybuddy.uni-wuppertal.de>

Editor: Joel Fuchs, University of Wuppertal

Granted by the Federal Ministry of Education and Research

Grant IDs:

16DHBKI016 (RWTH Aachen),  
16DHBKI017 (BU Wuppertal),  
16DHBKI018 (RU Bochum)

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# 1. Legal notice

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## 2. Preface

The joint research project *AIStudyBuddy* of the Universities of Aachen, Bochum and Wuppertal aims at developing a web-based application for students and study course designers to present an easy but also more detailed insight in study courses. The aims are

- to offer students the *StudyBuddy*, a tool for informed and evidence-based planning of course schedules, and
- to offer study course designers the *BuddyAnalytics*, an interactive tool for assisting in the decision process of the development of competency-based curricula, and student advising.

To reach this goal, data-based (keyword *process mining*) and rule-based (keyword *answer set programming*) AI-paradigms are used

- to analyse the study behaviour based on data of student information systems, learning management systems, and exam management systems, and
- to give feedback to students comprehensible by non-domain experts (i.e., persons not familiar with reading examination regulations and module reference books).

(See also Persike 2021, Inhaltliche Kurzbeschreibung des Vorhabens.)

Traditional data model developing (e.g., OMB 2012) starts with defining the goals of the application(s), identifying the users and their needs, developing the data model, and in the last step designing the application and defining the infrastructural requirements, at which in the last step the goals, the needs and the available data are getting together. In the project *AIStudyBuddy*, we do not have this traditional sequence. In fact, the work packages acquiring the needs of students and study course designer (Persike, 2021, AP2, and AP7), designing the applications (*ibid.*, AP3, AP6, and AP8), designing and implementing the infrastructure (*ibid.*, AP5), and last but not least designing the data reference model (*ibid.*, AP4) work all in parallel. Therefore, the design process of the data reference model never was a simple task of fulfilling input conditions and output demands, but was a dynamical process attempting to fulfil the input conditions of three very different local sources and the output demands of application engineering processes that even again were in their own design process.

Well, this document tries to describe and record the process of designing the data reference model of the project *AIStudyBuddy*. I hope I was successful.

Joel Emanuel Fuchs  
Bergische Universität Wuppertal,  
February 2025



### 3. Data model theory

This chapter is called *data model theory*, but we do not want to present techniques of data modelling nor give an introduction to *data model theory*. Instead, we need to define some terminologies if we talk about data models.

Considering just a simple [Structured Query Language \(SQL\)](#) data model, it will consist of tables. Tables consist of fields ordered into rows and columns. Columns are often refereed to as variables, or parameters, or attributes, or features. The columns have types, or domains, or characteristics. The domain of a nominal variable are categories, or factors, or levels.

Hence, it is quite easy to talk about data models and data modelling, convinced of talking about the same topic, but actually talking past each other. The first and maybe most important step is to use the same vocabulary when talking about data models, like columns are not variables, or parameter, or attributes, or features, but one of these and just one. This chapter will define the terminology we will use when talking about data models and only the vocabulary defined in this chapter will be used even if there are alternative expressions.

#### 3.1. Basic definitions

We will state some basic definitions.

##### Data and information

**3.1.1 Definition** (data). *Data* is a fact or record or a collection of facts or records in a form ready to be processed as saved, extracted, transformed, loaded, or visualized.

**3.1.2 Definition** (information). *Information* is the result of processed data as any textual or visualized results of analyses of data, or the expedient relation of data, or similar.

The relation between data and information is shown in Figure 3.1. The term ‘interpretation’ in this context is *not* specified.

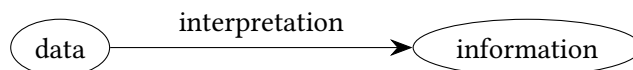


Figure 3.1.: Loose diagram to show the relation between data and information.

Please consider, that information is always data again (if stored in a way that makes further ‘interpretations’ possible), but data do not have to be information before not processed properly (if even possible).

| Entities     | Tables | Sociology   | Analytic | SQL    |
|--------------|--------|-------------|----------|--------|
| entity class | table  | population  | set      | table  |
| entity       | row    | observation | case     | record |
| attribute    | column | variable    | feature  | column |
| value        | cell   | value       | value    | field  |

Table 3.1.: An accordance of terminology between different approaches or fields of data analytic.

The fields Sociology and Analytic are not defined further; we just wanted to show, that there are plenty ways of grouping and naming data.

## objective, entity, and attribute

**3.1.3 Definition (entity).** All data related to a specific topic or theme or issue is called a *data set*. The structure of such a data set is called an *objective*; a particular instance of the objective is called an *objective instance*. The objective is divided into *entity classes*; a particular instance of an entity class is called an *entity instance*. Entity classes consist of *attributes*. The attributes of an entity instance are called *values*. All entity classes belonging to one objective are called an *entity set* of that objective and constitute the objective.

(This definition follows loosely the terminology of Simsion and Witt 2005 and Thalheim 2000.)

We do have to make some comments on the above definition. *First*, the definition provides a hierarchy, how data of a data set can be grouped. Beside specifying the three levels of objective, entity, and attribute respectively objective instance, entity instance, and value, no further constraints are given. Almost always, attributes are ‘atomic’ (the meaning of atomic is defined later) and the data set corresponds to the objective. But not always, and the design of the content of the three layers can change from model to model, even if certain standards dictate more constraints to the three layers. *Second*, the definition does not propose any relations between several objectives, entity classes, and/or attributes. By grouping data, we can assume that relations between these groups exist and have to be modelled as well. We will refer to this point later. *Third*, the terms *entity class* and *entity* are often used interchangeably. Below, we will introduce the entity object, that is an entity class together with its functions, constraints and relations. Last but not least, we have an one-to-one mapping between entity classes and tables, if all values of the data set can be expressed in a single cell of the table (e.g., if all attributes are ‘atomic’). Then, one table can express one and only one entity class, where every column represents an attribute, every row represents an entity instance, and every cell represents a value. A set of tables can represent a set of entities. Table 3.1 shows an accordance of terminology between different approaches.

Do not mix up: a set of entities can be any entities; an entity set are entities meant to be together.

Some DBMS like PostgreSQL allow non-atomic values in there cells.

The following example illustrates the use of the new terms in the context of our project.

**3.1.1 Example.** A *data set* could be all information of the [information management system \(IMS\)](#) (see also Definition 3.2.2) of a university. As first layer, you would group the data set by different *objectives*. Obvious objectives would be the [student life cycle \(SLC\)](#), examination regulations, and schedules and events. An *objective instance* regarding the SLC could be John Doe and his enrolment in the Bachelor degree program of computer science. A typical *entity class* of the SLC would be ‘person’ and the *entity instance* in our example would be ‘John Doe’. The entity class ‘person’ would consist out of *attributes* like surname, name, gender, or



nationality. Values of the entity instance ‘John Doe’ would be ‘Doe’, ‘John’, ‘male’, and ‘British’. In this context, an entity set could be ‘person’, ‘address’, ‘study course’, etc. If we follow the layers bottom up, we observe that entity classes are precise summaries of attributes belonging together. An entity set is a set of entity classes that ‘belong together’ – also clearly defined by its entity classes, although many different sets are possible (e.g., every set of entity classes linked by relations is an entity set). Whereas, objectives are vague summaries of entities related to the same scope – more like a concept to describe the information hidden in the data. As a consequence, the layer of objectives is rarely used.

An *accordance* is only defined by attributes, not by entities!

**3.1.4 Definition** (data accordance). A one-to-one mapping or an injective function  $f$  from a set of attributes  $A$  to another set of attributes  $B$  is called a *data accordance*. If we have several sets of attributes  $A_1$  to  $A_n$ , all mapped to a mutual set of attributes  $A_{\text{accor}}$  by injective mappings  $f_i : A_i \rightarrow A_{\text{accor}}, i = 1, \dots, n$ , then  $A_{\text{accor}}$  is called the *set of accordance* (sometimes also *entity of accordance* or *model of accordance*). Are all  $f_i : A_i \rightarrow A_{\text{accor}}, i = 1, \dots, n$  surjective mappings, then we speak of a *complete data accordance*.

*Remark.* There are two cases to be distinguished talking about *data accordance*: the one with a *set of accordance* and the one without it. A good example of having accordance mappings are the four Gospels. An accordance shows the parts of the Gospels that are referring to identical stories. Of course, we do not want to have a fifth Gospel as ‘Gospel of accordance’. So there is not mutual set all Gospels refer to. The situation is completely different for [data base reference model \(DRM\)](#). We do not want to analyse  $n$  models, but one model everyone is referring to – the *model of accordance*. In an early design process stage, the mappings are actually done to supervise that everyone can map its data onto the DRM. In a later stage, the mappings become irrelevant, because we turn around the accountability: looking at the data of the project partners, mapping them to an accordance, and retrieving to a mutual DRM will be neglected in favour of designing the DRM first and then demanding the existence of a proper mapping of the project partners.

**3.1.5 Definition** (relationship). A *relationship* is a mapping from the instances of an entity to the instances of an entity. Let  $A$  and  $B$  be two entities. We call a relationship an *1 : 1 relationship* from  $A$  to  $B$ , if every instance of  $A$  is assigned to at most one instance of  $B$  and vice versa. We call a relationship an *1 :  $n$  relationship* from  $A$  to  $B$ , if every instance of  $A$  is assigned to at most  $n$  instances of  $B$  and every instance of  $B$  is assigned to at most one instance of  $A$ . We call a relationship an  *$n : m$  relationship* from  $A$  to  $B$ , if at most  $n$  instances of  $A$  are assigned to a single instance of  $B$  and at most  $m$  instances of  $B$  are assigned to a single instance of  $A$ . The kind of relationship, i.e., 1 : 1, 1 :  $n$ , and so on, is called the *cardinality* of the *relationship*.

We want to exemplify this definition a bit by the following remarks.

*Remark.* Definition 3.1.5 is a weak definition of relationships, because it always allows, that less than the denoted number of entity instances or even none are mapped. A stronger definition would be noted by  $(n_1, n_2) : (m_1, m_2), n_1 \leq n_2, m_1 \leq m_2, n_1, n_2, m_1, m_2 \in \mathbb{N}_0$ , meaning, that each instance of  $A$  is assigned to a minimum of  $m_1$  and a maximum of  $m_2$  instances of  $B$ , an each instance of  $B$  is assigned to a minimum of  $n_1$  and a maximum of  $n_2$  instances of  $A$ . In most cases, the weak definition is more than sufficient.

**3.1.2 Example.** The relationships are quite ‘natural’. Let our entity  $A$  be ‘House’ and  $B$  be ‘Flat’. A specific house can have 1 ‘Flat’, or it has several flats. Thus, we have an 1 :  $n$  relationship

from ‘House’ to ‘Flat’. Let a third entity be ‘Street’. Every house stands in one and only one street (forget about the special cases). More than one house stands in most streets. Thus, we have a  $1:n$  relationship from ‘Street’ to ‘House’. A bit more complicated is the case of our next entity: ‘Person’. Several persons can live in one flat, but also one person can live in two or more flats (of course not at the same time). Thus, we have a  $n:m$  relationship from ‘Flat’ to ‘Person’.

*Remark.* Using SQL tables, we have the special case, that  $1:1$  and  $1:n$  relationships can be expressed by adding another attribute to the entities. If  $n$  instances of  $B$  are mapped to a single instance of  $A$  and  $A$  has a unique attribute, i.e., an attribute identifying uniquely each instance or rather an id, then a copy of that id can be attached as attribute to the respective instances of  $B$ .

### 3.1.1. Data models

There are three essential terms talking about data model theory: *data model*, *data base*, and *data base model*. These three terms – especially data model and data base model – are often used synonymously and in daily practice it does not make any difference. Still, these three terms have different definitions.

**3.1.6 Definition** (data model). A *data model* is the description of data (see Definition 3.1.1) together with a description of how data is organized.

*Remark.* This definition is extremely general and uncommon. Other definition of the term data model are more specific but limiting. One alternative definition would be that a data model is a mapping of data to attributes, where an attribute is a description of data, whereat an attribute identifies a collective data set (e.g., ‘name’), the type and form of data (e.g., ‘string’), and further characteristics like constraints, functions (for derived attributes) or references (e.g., to key tables). Furthermore, a data model consists out of entities and their characteristics (see Definition 3.1.3), gathering directly conjunct attributes, i.e., attributes where each instance of an attribute is explicitly and by the entity linked to the other attributes’ instances (e.g., ‘name’ and ‘surname’, though the link between both is given by an instance of the entity). Last but not least, the data model consist out of a set of relationships between the entities and its characteristics, specifying which entities are related among each other and by which cardinality (e.g.,  $1:n$ ,  $n:m$ ). This definition of a data model is valid, but it restricts each data model description to attributes, entities and relationships. Although attributes can be employed to a wide range of data (e.g., an attribute can be an entity again – the definition imposed no restrictions on the kind of data), some models, especially semantic ones, will not fit this definition of a data model. The more general definition in Definition 3.1.6 does.

*A semantic model describes the data and its organization by prose.*

**3.1.7 Definition** (data base). A *data base* is an collection of data stored and accessed through a (*data base*) *management system*.

*Remark.* A *data base* consist of two parts: an *collection of data* and a *management system*. Compared to the definition of a data model, we have an opposed definition. A data base consists of an actual collection of data, while a data model does not. On the other hand, a data model defines how data is described or classified, while the collection of data is probably organized

in some way, but neither a description nor a classification or collective attributes are declared. The data base consists of a management system to access the data, i.e., it is possible to retrieve specific data of the data collection. Even though this system applies a schema on the data, otherwise a specific access would be impossible. But an explicit definition of relations between data does not have to exist, e.g., every piece of data is accessible without any relation to other. On the other hand, a data model cannot access any data (even more it does not contain any data), but specifies the relation between data.

Both objects, the *data model* and the *data base*, complement one another perfectly leading to the *data base model*.

**3.1.8 Definition** (data base model). A *data base model* is a data base to which a data model is applied.

*Remark.* A *data base model* consists out of four parts: a description of data, its organization, a collection of data, and a management system. Theoretically, the collection of data can be the empty set as well. There are two things worth mentioning in this definition:

- The collection of data has to fit the description of data.
- The characteristics and organization of data has to fit the management system.

Both points can be formulated the other way around and more precisely:

- The description of data has to be formulated in a way that the collection of data fits the description and every dissenting data is misfitting.
- The management system has to be chosen such that it can reflect the data characteristics and the data organization of the data model in a unique way.

The first point is very clear. For example, having a name as data piece, than the data description of such a collective item (i.e., a description of any name) should be '*name*' as string. Referring to dissenting data, this term is vague and interpretative. However, a description like '*text*' as string would not be clear for any user. Second, not every management supports every data model. As stated above, in a general data model an entity as attribute would be allowed. Most management systems cannot reflect such a construction. That means, every management system reduces the set of possible data models. What sounds like a disadvantage is hardly noticeable, because most people are such familiar with particular management systems (e.g., SQL based management systems) that they automatically design data models fitting such management systems.

Following definitions hold for data models where data is organized in tables (the equivalent of entities) and by relation between these tables through mapping foreign keys of one table to (unique) primary keys of another table. This type of organization is a premise for using SQL.

**3.1.9 Definition** (Star schema). A *fact table* is a table holding quantitative data of one or more attributes (columns) for aggregation and other analyses. A *dimension table* is a table holding qualitative data, i.e., one or more attributes are capable of grouping the data of the fact table. The star schema occurs when there is one and only one (central) fact table connected with one or more dimension tables. The connections between fact table and dimension tables are the only one that exists.

*This is neither a definition nor a proposition, so we are a bit sloppy here.*

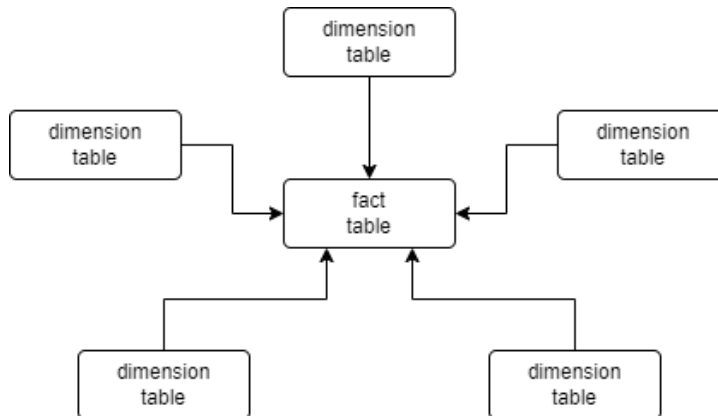


Figure 3.2.: Schematic diagram of the star schema in Bachman notation.

**3.1.10 Definition** (Snowflake schema). The *snowflake schema* occurs as a *star schema* with normalized *dimension tables*. That means there is one and only one *fact table* connected to one or more *normalized dimension tables* each of them exclusively connected with the fact table and the tables that are generated by normalizing the dimension tables.

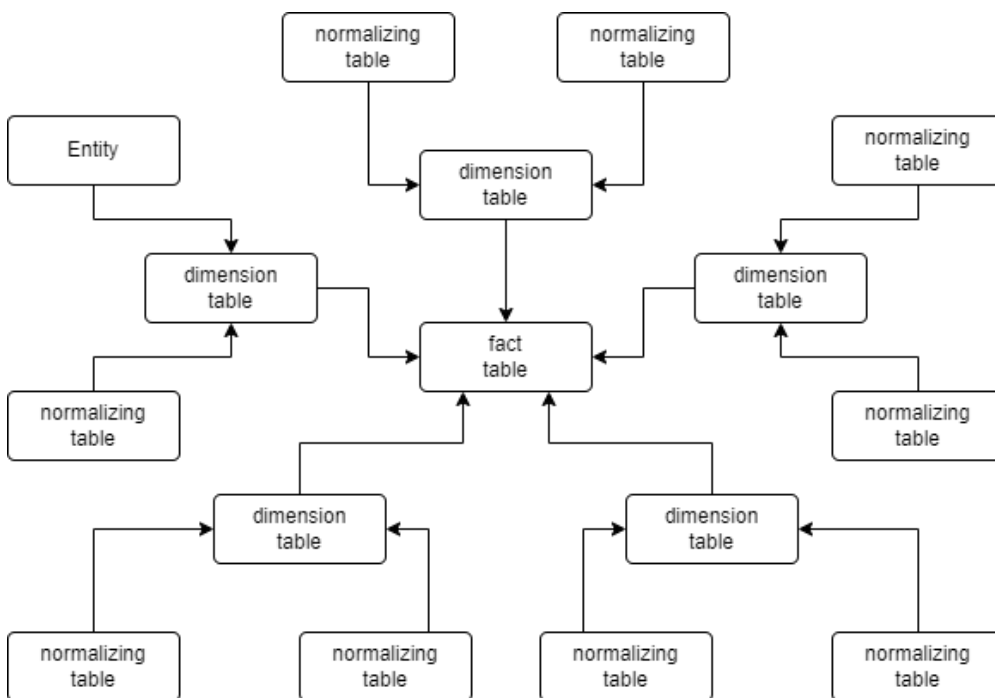


Figure 3.3.: Schematic diagram of the snowflake schema in Bachman notation.

**3.1.11 Definition** (Galaxy schema). The *galaxy schema* or *fact constellation schema* consist of two or more fact tables that share one or more dimension tables, in other words, a dimension table can be connected to one or more fact tables.

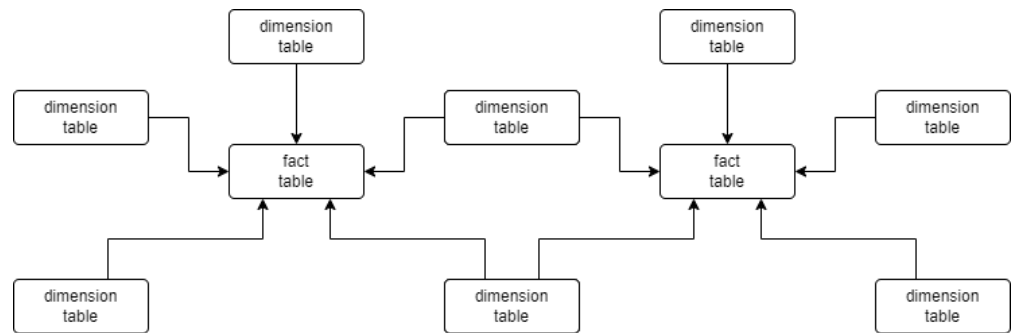


Figure 3.4.: Schematic diagram of the galaxy schema in Bachman notation.

*Remark.* A combination of snowflake and galaxy scheme is possible, of course. In this case, the dimension tables would be normalized. But only this three schemes (star, snowflake, galaxy) are usually defined.

See Li, Shen, and Yang 2024, Moody and Kortink 2000, and Saxena and Agarwal 2014 for more information on data model schemes, and Song, Evans, and Park, 1995 for more information on the Bachman (Bachman, 1969) notation.

**3.1.12 Definition** (Link table). Given a data model with at least two entities. A table is named *link table* if and only if it contains only foreign keys beside its own primary key and no further information. In a table based data model, *link tables* can realize a  $n:m$  relation between two tables by having a  $1:n$  relation with one table, and a  $1:m$  relation with the other.

**3.1.13 Definition** (Star-like link schema). A *star-like link schema* is a data model with one link table and two or more tables connected and only connected to the link table.

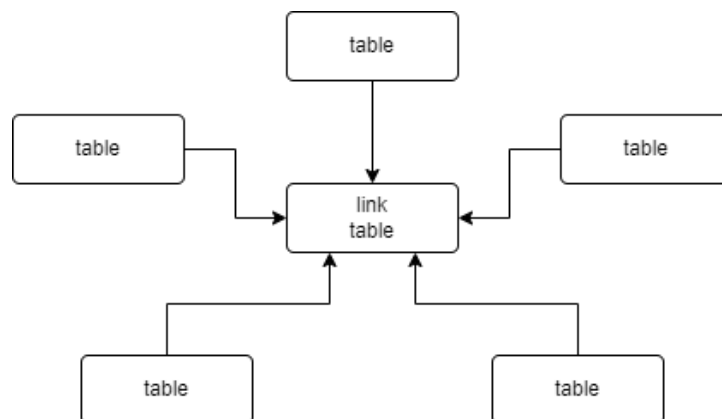


Figure 3.5.: Schematic diagram of the star like link schema in Bachman notation.

*Remark.* In this way, snowflake-like and galaxy-like link schemes are defined.

## 3.2. Data administration

The first section was generally about data. But data is always organized, at least in two ways: how it is stored and how people interact with data. Hence, we need some terms not only to talk about data, but also to talk about administration of data.

### 3.2.1. data assets and IMS

**3.2.1 Definition** (data asset). By a *data asset* we understand the data available under the administrative authority of a (sub)institution or organizational unit. The *administration authority* of a *data asset* like every person or unit that possesses, administrates, or regulates the access to data is called a *shareholder*. A person, (sub)institution, organizational unit, or party that is interested into a *data asset*, i.e. possesses, administrates, regulates, but also transmits, stores, reads, processes, analyses, represents, visualize, or consumes data or the evaluation or outcome of such operations, or is interested about how data is stored, processed and accessed, is called a *stakeholder*.

Data assets are rarely mentioned; data repositories or bases are more common.

Common sub-institutions or organizational units of a university are the Central Office of Examinations (*German*: Zentrales Prüfungsamt), or the Student Service Office (*German*: Studierendensekretariat). At the same time, these are the *shareholder* of the *data assets*. The joint project *AIStudyBuddy (AISB)* is one of the *stakeholders*, but the *shareholders* are concurrently *stakeholders*, too, interested in the privacy-protection and permission for the usage of their data. Indeed, every *shareholder* of data is simultaneously a *stakeholder*.

**3.2.2 Definition** (information management system). An IMS is a collection of software programs to read, store, manage, proceed, analyses, administrate, and output data and information within a software. The concrete installation of an IMS is also referred to as an IMS. The concrete IMS is the setting of the IMS software, the used platform and infrastructure.

The term IMS is rarely used. More conventional are terms referring to the focus of the deployed IMS. Common terms are *campus management system (CMS)*, *student management system (SMS)*, or *learning management system (LMS)*. These systems are all IMS, but because of their much broader functionality, they are not called that.

**3.2.3 Definition** (data repository). A *data repository* is a storage of (analogue or digital stored) data in a form that allows third-party access. In the expanded definition beside the data and the access options, also maintenance, privacy-protection, administration, safekeeping, and further process descriptions are part of a repository including authorities and maintainer. A special case of the repository is the *data infrastructure*, meaning always a digital data storage with standardized third-party access.

Normally, every IMS is simultaneously a data repository. But also the examination regulations, most times only available in PDF format, are a data repository if collected at a central storage and ordered for example by degree program.

The difference between data infrastructure and data base infrastructure are smooth. A data base infrastructure always includes a DBMS, while a data infrastructure does not have to.

**3.2.4 Definition (data base architecture).** A *data base infrastructure* is defined as a data asset stored in machine-readable form together with all software, hardware, interfaces, and communication protocols involved in storing, processing, retaining, receiving, and delivering, plus securing (against prohibited access), protecting (against data loss), and administrating data. A *data base architecture (DBA)* is a *data base infrastructure* including all non-technological parts for maintaining the *data base infrastructure*, that are operating organizations and units, data- and privacy-policies, and descriptions of management processes and usage guidelines.

Next, we will define the term ‘metadata’. Generally speaking, metadata is any data about data. For example, having 500 records of any experiment, then already the number of records (500) is metadata. A stronger definition of metadata can be made in the context of a *data base management system (DBMS)*.

**3.2.5 Definition.** *Metadata* is any data about data that can be used to group, order, access, or manage data or parts of data of a DBMS and is stored in the DBMS again, i.e., that can be expressed as entities and/or attributes.

Please note the important point, that metadata itself is stored in the DBMS. Even if entity classes and relations, or domains of attributes are data about data, these information are generally not stored in the DBMS and therefore information about entities and attributes are not metadata. If we refer to the term metadata, we mean data that provide information about data in the sense, that it enables grouping records of different objectives, handling records by time-stamps or the provision of storage-links for managing the DBMS. These are classical examples.

There are two points worth of mentioning: First, do not mix up raw or processed data on the one hand and metadata on the other hand. The gender of a person (if recorded) is raw data. Even if we can group all persons by their gender, gender is no metadata, because it is not data about data. An additional table containing the number of persons, and the number of persons by gender would be metadata – as long as this table is stored in the DBMS. Second, a time-stamp (e.g., the information at which time a record was last altered in the DBMS) is metadata and can be part of the record itself as an additional attribute in an entity, or can be stored in an additional entity respectively table (for table-based DBMS). There is no ‘rule’ how metadata has to be stored except as part of the DBMS and expressible as entities and/or attributes of entities.

The definition of metadata and analysis results can be fluent.

### 3.2.2. Data responsibilities

Talking about data and IMSs, rarely we will have the situation, that one institution alone is involved in acquiring, maintaining, and administrating data. More common, an IMS is integrated into the own data infrastructure, and consequently the support comes from a third party. Even though the ownership of data is clear in almost all cases (the institution acquiring the data should also be the owner of the data), the rights affiliated to the ownership do not belong to the owner of the data. We have to distinguish between the rights of possession belonging to the owner of the data and rights of utilization belonging to the licenser of the IMS and support provider (beside applicable privacy-protection laws). The differentiation between



rights of possession and right of utilization is uncommon. Instead of that, the following three terms are used.

**3.2.6 Definition** (data owner, steward, custodian). The *data owner* is a legal entity who possesses the data. This possession is embodied by two important traits. First, the *owner* has to give its approval to any access, processing, transformation, transmitting, analysis, or to any other act involving the data. Second, the *owner* is responsible for the data, particularly as the responsibility interferes with the *general data protection regulation (GDPR)* (Feiler and Forgó, 2016). The *data steward* is a more data-driven role. *Stewards* are responsible for the content that is stored in a data base infrastructure. The *steward* is responsible for quality and documentation of data, that is in-putted or out-putted, as maintaining and sorting the data in the data base infrastructure – in particular concerning the meta-data. The *data custodian* is a more technique-driven role. *Custodians* are responsible for the infrastructure of the data base infrastructure. They install, maintain, and support the infrastructure. A *custodian* is responsible for any process regarding reading, transforming, analysing, and representing data and information. Again, quality and documentation of data is in focus of the *custodian*.

*Owner, steward, and custodian are important parts of data governance (Ralph Kimball, 2013; Tupper, 2011).*

Here are some comments on this definition. First, the *data owner* is a role that is not involved in any data process except on data acquisition and information representing to legally allow or permit these. Second, the *data steward* sort of represents the business processes, knowing best what data using which format should be put in the data base infrastructure, and what information using which representation should be put out. The *data custodian* sort of represents the information technology, knowing best how the data should be stored and how the information should be obtained. This is a very classical layout, as often *data stewards* are part of the business administration, while *data custodians* are part of the IT department. Fourth, rarely there is one and only one *owner*, one *steward*, and one *custodian*. There is one *owner* per data asset and/or objective; this can be the same *owner* for each, or varying *owners*. The role of the *owner* can be fulfilled by more than one person or department; e.g. equally by the CEO, the CIO and the office of privacy-protection. Most times, a *data steward* is responsible only for one entity or a certain entity set, so that every entity has its own *steward*. The role of the *steward* can be fulfilled by more than one person. Transmission, maintenance, documentation, etc. are duties and responsibilities suitable for being apportioned. In the same matter, the role of a *data custodian* has not one single task and even not one single work area. Every data base infrastructure consists out of the four main (technical) areas hardware, software, network connections/interface, and user access. Usually, these areas are split between departments or even between companies. Last but not least, in Table 3.2 we loosely mention some further examples of responsibilities and responsible positions in connection with the three data roles. Management, administration, maintenance, auditing, safeguard, these are all keywords appearing in conjunction with *data stewards* and *data custodians*. The two terms are not exclusive, but their areas have an overlap. The differentiation between *steward* and *custodian* becomes important in the real case, every time we can actually say which authorizations are given to *stewards* (the people who work on the data, e.g., a department of a university) and the *custodians* (the people who are responsible for the infrastructure, e.g., a software company distributing a certain IMS).



### 3.3. Development methodology

The [joint research project description \(JPD\)](#) states as development methodology the [plan-do-check-act cycle \(PDCA\)](#).

*Remark* (plan-do-check-act). The *plan-do-check-act cycle* is an iterative design methodology. Regarding this methodology, the design process is organized in consecutive cycles. Each cycle consist of for stages:

1. plan: establish objectives or processes, design model iteration
2. do: test objectives or processes, apply real data to data model
3. check: analyse do phase, record and generalize problems of real data fitting to data model
4. act: improve processes, draw conclusions from recorded problems for next planing phase

For more information about PDCA see Gidey et al. [2014](#) or Sokovic, Pavletic, and Pipan [2010](#).

| role           | example                                                                                                                                                                                                                                                                                                            |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| data owner     | (enterprise) administration<br>(enterprise) management<br>legal department                                                                                                                                                                                                                                         |
| data steward   | office of privacy-protection<br>access administration<br>controlling<br>data asset administration<br>data asset management<br>data documentation<br>data input and output<br>data integrity (for input data)<br>data maintenance<br>quality management                                                             |
| data custodian | access management and securing capabilities<br>audition possibilities<br>change management and history of changes<br>content and context rules<br>data base administration<br>data integrity (for transformations)<br>data modelling<br>data safeguard measures<br>ETL developing<br>quality management<br>storage |

Table 3.2.: Examples of typical responsibilities or responsible positions for each role.

Similar concepts are extreme programming (Beck, 2000), *DMAIC* and *DMADV* (Boehm, 1988), or the spiral model (*ibid.*). Whether a certain methodology is deployed explicitly or not, no-one would apply a methodology in its pure form. All methodologies together form a toolbox of helpful instruments, each applied to certain parts or problems of a project and not all solely from one methodology. Even though the JPD states the PDCA methodology as the applied one, the methodology used in the project is more like a compilation of several methodical instruments.

Below, we will represent several versions of the DRM. Each main version can be considered as one iteration cycle. Every iteration cycle had one main focus (see list below). The various release numbers indicates, that the stages plan and act (the stages at which release changes are done) are executed isolated, but the stages plan, do, act, and check cross over owing the fact to keep discussion and planning interactively.

The following iterations are cycled so far:

**Version 0** Determination on a basic data model concept.

**Version 1** Gathering and discussing all possible data items.

**Version 2** Reducing to data items required by other teams.

**Version 3** Linking the DRM to other project elements.

## 4. Version Zero

In this chapter, we do not present a data model version 0, but in the process of designing a data reference model, we did have some preliminary thoughts. These considerations are summarized under the title ‘Version Zero’.

### 4.1. Joint research project description (JPD)

The *joint research project description (JPD)* (German: Verbundvorhabenbeschreibung, Persike 2021) proposes the creation of a common data reference model for the standardized processing of data from the individual information systems. The JPD states

- the use of “data from campus management, learning management and examination systems”<sup>1</sup>, and
- “the strategic goal of standardized exchange of student data as first step towards cross-university student monitoring”<sup>2</sup>.

These goals are to be realized by

- “a general definition of a data reference model for *course of studies* progresses”,<sup>3</sup> and
- “extracting and storing data out of various university *information management systems (IMSs)*”.<sup>4</sup>

The JPD is organized into several ‘work packages’ (German: ‘Arbeitspakete’).<sup>5</sup> The nine work packages handle

1. the project management,
2. development of the *Study Buddy* web-application,

<sup>1</sup>“der Daten aus Campus-, Lernmanagement- und Prüfungssystemen” (Persike, 2021, 1. Inhaltliche Kurzbeschreibung des Vorhabens)

<sup>2</sup>“Strategisches Ziel ist der standardisierte Austausch von Studiendaten als erster Schritt zum hochschulübergreifenden Studienmonitoring” (ibid., 1. Inhaltliche Kurzbeschreibung des Vorhabens)

<sup>3</sup>“die gemeinsame Definition eines Referenzmodells von Studienfortschrittsdaten.” (ibid., 4. Methodisches Vorgehen und Zusammenarbeit)

<sup>4</sup>“aus unterschiedlichen Hochschulsystem Daten extrahiert und gespeichert.” (ibid., 6. Einsatz von KI zur Verbesserung der Hochschulbildung)

<sup>5</sup>We will use the German abbreviation *AP* for work packages instead of *WP* to be conform with ibid. and the terminology of the project.

3. development of model-based planning of courses of studies using rule-based AI-technology (keyword: [ASP](#)),
4. data acquisition and privacy approval to establish a [data base reference model \(DRM\)](#),
5. development of a reference architecture for AI-based study course monitoring,
6. development of a student cohort tracing using [Process Mining \(PM\)](#),
7. development of the [Buddy Analytics](#) web-application,
8. analysing, processing and presenting AI-based recommendations for the Study Buddy, and
9. documentation and publication.

(Also see Persike [2021](#), Teil B, 1. Ausführliche Darstellung des Arbeitsprogramms.)

As you can see, the DRM is located in the [work package \(AP\) 4](#). Every work package contains out of several sub-packages (*German*: Unterarbeitspakete). We want to specify the sub-packages of AP 4 that are

- 4.1 recording all project-oriented, available data with regard to privacy-protection,
- 4.2 determining legal practice possibilities for research operation,
- 4.3 determining legal practice possibilities for regular operation,
- 4.4 constructive, ethical evaluating of consequences of the potential of surveillance and control
- 4.5 designing of a DRM,
- 4.6 designing a concept of privacy-protection,
- 4.7 administratively implementing the reference model, and
- 4.8 designing a clearing house.

Also see appendix [B](#) for a full version.

As quintessence, we can retain that the DRM of the [AISTudyBuddy \(AISB\)](#) should reflect the complete [student life cycle \(SLC\)](#) and frame a basis for a data warehouse as central storage used by Study Buddy and Buddy Analytics.

## 4.2. Initial positions

Before we present the *DRM version 0*, we want to portray the preconditions that prevailed at the start of the work of AP 4. In books about data model design – as mentioned in the preface – you get the impression a data model designer is free of all limitations and can always create the most optimal model that is possible and obvious to the designer. Unfortunately, reality is different. The model has to fit into an existing setting, determined by prerequisite and demands of other parties. Some of these parties are presented next.

### 4.2.1. The ‘inner’ stakeholders

As mentioned before, there are several APs involved in the [joint research project \(JRP\)](#). Figure 4.1 shows a simplified presentation of the APs and the relations to each other. As you can see, all work packages are based on the DRM and the [data base architecture \(DBA\)](#) of APs 4 and 5.

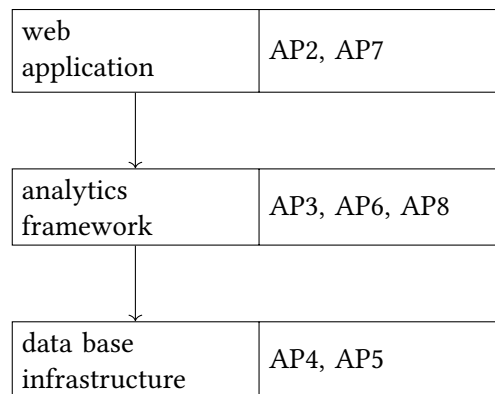


Figure 4.1.: Simplified representation of the APs and their scopes.

How different stakeholders, scopes and APs are influencing the DBA is shown by an example from the *University of Wuppertal* as shown in Figure 4.2. Information of the SLC is handled by AP 4, while information about [degree programs](#) is handled by AP 3. The duty of the DRM and consequently of AP 4 is to consider not only its own demands, but the requirements on the DRM of all APs.

At this point – but also at the next ones – you can see, that the classical way of designing a DRM (e.g., defining goals, exploring user behaviour, acquiring data, installing data infrastructure and analytic software, and at last gaining access) can not be applied to our design process. The exploring of the user behaviour and the user demands (APs 2 and 7), as the creation of the analytic software (APs 3, 6 and 8) work in parallel to the development of the DRM and the [data base reference architecture \(DRA\)](#) (APs 4 and 5). In comparison to the classical approach (serial development) our parallel approach is less structured and goals and demands are elaborated while designing the DRM.

### 4.2.2. The ‘outer’ stakeholder

Besides the various interests inside the project, there are also interest from outside the project. The stakeholder who are having interests concerning the project and are not part of one of the project members (also see a list of the project members in the Appendix A) are called ‘outer’ stakeholder. Furthermore, the group of outer stakeholder can be divided into two sub-groups: stakeholder being part of one of the three universities and stakeholder from outside the universities.

As an example of outer stakeholder inside the university area, we will shortly discuss the situation at the University of Wuppertal. The JRP is located in the area of responsibility of Depart-

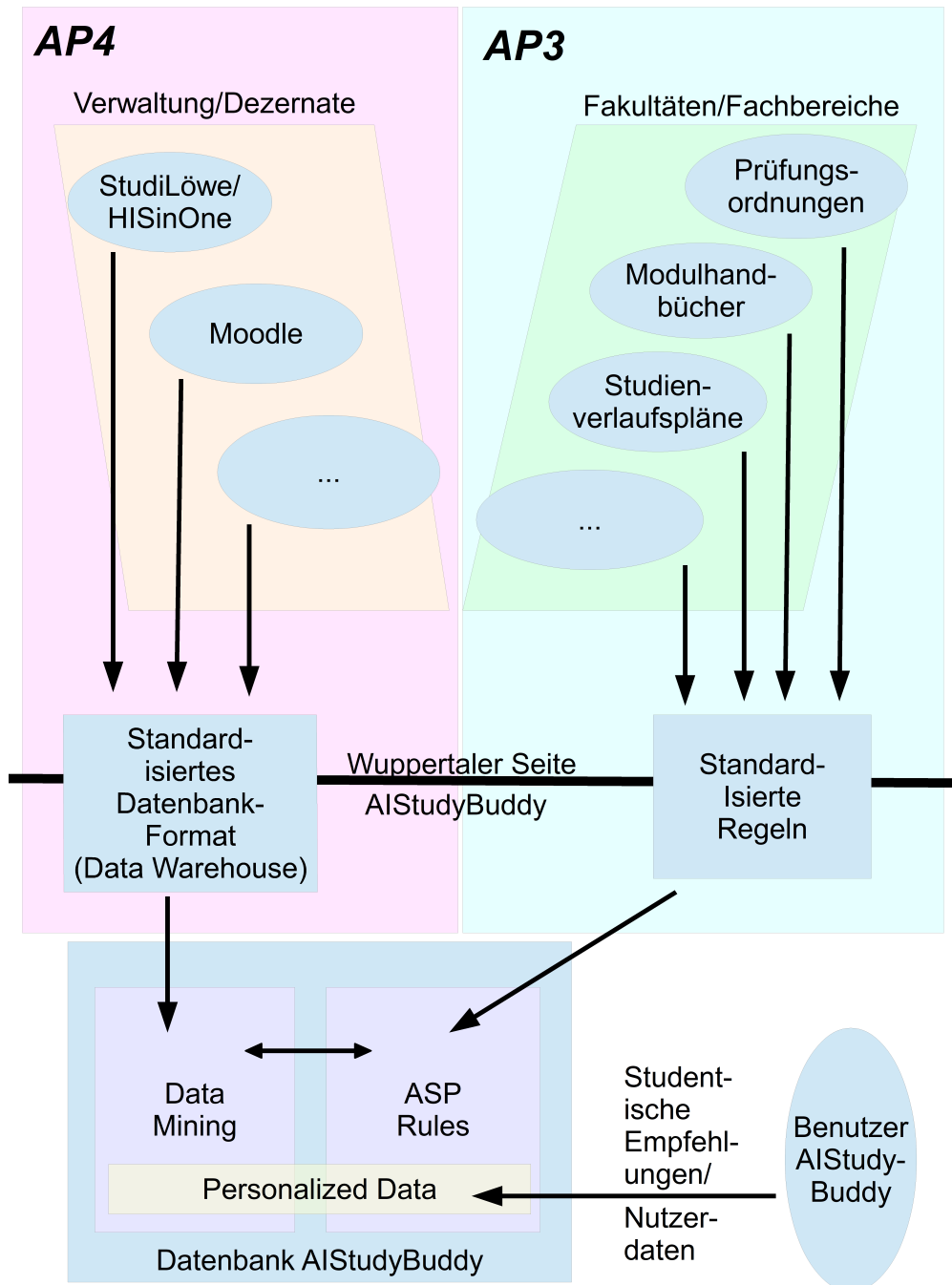


Figure 4.2.: First draft of representation of data flows related to the University of Wuppertal, December 2021.

| University | IMS        | operating agency                                                           |
|------------|------------|----------------------------------------------------------------------------|
| Aachen     | RWTHonline | IT Center <sup>6</sup> , and<br>CAMPUSonline, Graz                         |
| Bochum     | FlexNow    | FlexNow RUB Support, and<br>Institut für Hochschulsoftware, Bamberg        |
| Wuppertal  | HISinOne   | Department 7 <sup>7</sup> , and<br>Hochschul-Informations-System, Hannover |

Table 4.1.: IMSs involved in the first stage of the data model design.

ment 6 (Department of Studies, Teaching and Quality Management), that is the administrative unit the QSL belongs to (see Appendix A). However, the shareholder of the data concerning the SLC is Department 3 (Office of Student Affairs); they have to approve the use of data concerning the SLC. Mainly questions about privacy-protection are treated in this context. After the approval is given, Department 7 (Department of Organizational Development and Information Technology), who are administrating the [campus management systems \(CMSs\)](#), is transmitting the data of the SLC to Department 6. This data supply chain is also shown in Figure 4.3.

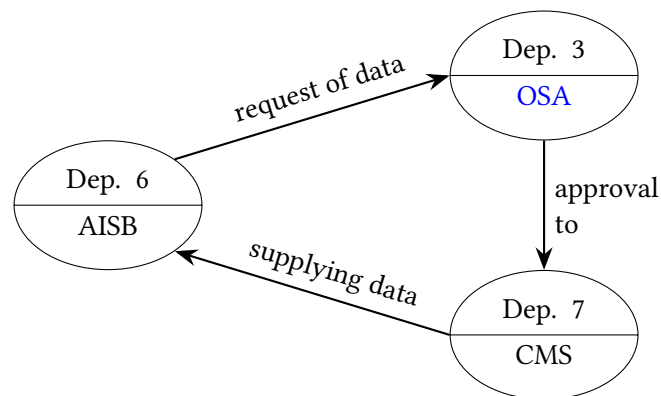


Figure 4.3.: Stakeholder relations within university organizational structures on the example of the University of Wuppertal.

The bottom line of this example is, that for reproducing the SLC by a DRM as postulated in the JPD it would be a favourable situation to choose all the attributes in need without any restrictions. Nevertheless, the reality not only at the University of Wuppertal, but at all three universities is that every desired variable needs to be checked for its availability and approval of data, leading sometimes to shorter, sometimes to longer acquisition times.

As mentioned above, there are stakeholders from outside the universities, too. In our context, these are the providers of the IMSs. Every university has one or more IMSs. The IMSs involved in the first stage of the data model design process are listed in Table 4.1.

Every IMS operating agency has its own services and requirements to access data. All three systems (RWTHonline, FlexNow, and HISinOne) are not designed to export raw data as needed

*There are more 'outer' stakeholders: pupils, politicians, etc. But they are irrelevant in this context right now.*

<sup>6</sup>Central IT facility of the University of Aachen

<sup>7</sup>Department of Organizational Development and Information Technology, University of Wuppertal

| Scope                                | Stakeholder                                                                        |
|--------------------------------------|------------------------------------------------------------------------------------|
| Main<br>Inner stakeholders           | APs 4 and 5<br>the work packages, and<br>the project participants (see Appendix A) |
| Outer university<br>stakeholder      | Administration,<br>Office of privacy-protection, and<br>IT services                |
| Outer non-university<br>stakeholders | IMS operating agencies                                                             |

Table 4.2.: Categories of stakeholders involved in the designing process.

for AISB. They are primarily CMSs designed to export aggregated and processed data, i.e. information, to students, lecturers and administration, not to feed secondary analytic systems. Nevertheless, the help and support of these agencies are mandatory for designing a data model.

Table 4.2 shows a list of all categories of stakeholder involved in the designing process of a DRM. Therefore, a conventional textbook design process was not possible. Indeed, the process was accompanied by the attempt to keep all requirements, demands, and constraints together with the goals of the project at equilibrium.

### 4.2.3. Preliminary work

Several preliminary projects exist that influenced the DRM. The JPD explicitly mentions four of them: *FragSte* and *ASSIST*, both at the University of Wuppertal, *KI:edu.NRW* at the Universities of Aachen and Bochum, and *Learning Analytics* at the University of Aachen.

#### FragSte and ASSIST

In the research project *FragSte* (Berens et al., 2019), “an early warning system for identifying impending study dropouts will be developed and the impact of an intervention after early detection will be tested. Subsequently, the effectiveness of the existing landscape of measures against dropouts will be evaluated with the help of the early warning system. Of particular interest is the comparison of the different study programs - especially the STEM subjects - as well as the comparison between students with and without migration background. The early warning system is to be designed in such a way that it can also be implemented at other universities”<sup>8</sup>. The bottom line in relation to AISB is the aim of *FragSte* to examine the SLC – meaning the usage of a very similar *conceptual scheme* – to predict study dropouts at the earliest possible point in time.

In the research project *ASSIST*, “an AI-supported feedback portal is designed and tested as an intelligent assistance system for students. In this portal, students are shown their student performance in absolute terms and in relation to their cohort as well as their probability of success. In addition, students are shown the effects of performance in the following semester

<sup>8</sup><https://www.wib.uni-wuppertal.de/en/research/projects/higher-education/early-identification-of-dropouts/>  
(30.03.2023)



in CP and grade as well as passed specific exams on the probability of success in various scenarios. If students confirm their inclination to change, the effects of a change of program on the probability of success are also displayed in various predefined and self-selected scenarios. The portal is intended to provide students with an early decision-making basis for the further course of their studies by revealing their future course and the efforts required for successful completion of their studies”<sup>9</sup>. The project is in an early research stage, therefore there are no publications yet to refer to.

### **KI:edu.nrw**

In the research project *KI:edu.nrw*, “the project partners Ruhr-University Bochum and RWTH Aachen are exploring, designing, and testing possibilities [of software for learning analytics] for the higher education sector, focusing on three different levels: the level of the course, the level of the institution of higher education, and the level of cross-university cooperation. In this context, several activities mentioned below are planned. For the broad approach, a group of people from RUB and RWTH with broad expertise work together: included are, among others, specialists for the topics educational data mining, machine learning, educational psychology, ethics of artificial intelligence, science didactics, as well as learning management systems; involved are the deans of different study programs as well as the Center for Science Didactics, the Center for Medical Teaching, the Center for Higher Education Didactics of Mathematics, as well as the Central Student Advisory Service. The Center for Teaching and Learning Services [CLS] at RWTH Aachen University is involved as an external cooperation partner. [...] The aim of the project is to determine how rules, concepts, processes, and technology can be designed for the use of learning analytics both at the Ruhr University, which is funded in the focus area, and at RWTH Aachen University, which is linked in partnership”<sup>10</sup>.

Remarkable in relation to the designing of a data reference model for the AISB are the technologies used in this project. As base data warehouse, the data warehouse system ‘Learning Locker’<sup>11</sup> is applied. It is an open source [learning record store \(LRS\)](#) for tracking learning data using the [Experience API \(xAPI\)](#). The communication between the LRS, analytic software programs, and user interfaces are managed by an RWTH internally developed infrastructure called ‘ExcaliburLA’ (Judel and Schroeder, 2022). Both technologies – LearningLocker and ExcaliburLA – are also implemented in AISB.

### **RWTHanalytics/Learning Analytics**

In the research project *RWTHanalytics*, the aim is “to establish a RWTH-wide service offering in the field of academic analytics for students, teachers, and the institutions supporting teaching. Our goal is to further develop studies and teaching in an evidence-based and data driven way. To this end, our team works both within and outside RWTH in diverse alliances in order to involve all stakeholders from the outset in the spirit of the ‘Aachen Way’ and to be able to jointly create a sustainable offering. The project results are consistently published as open

<sup>9</sup><https://www.wib.uni-wuppertal.de/en/research/projects/higher-education/intelligent-performance-cockpit-for-students/> (30.03.2023)

<sup>10</sup><https://cls.rwth-aachen.de/cms/cls/Services-und-Projekte/~wrrqh/KI-edu-nrw/?lidx=1> (30.03.2023)

<sup>11</sup><https://github.com/LearningLocker> (30.03.2023)

resources, for example as open source software or as open educational resources.”<sup>12</sup> For more information concerning the project see Pouya Soudmand [2022](#).

In this project a data base architecture similar to the one in the project *KI:edu.nrw* is implemented. In this sense, *KI:edu.nrw*, *RWTHanalytics*, and *AISB* can be considered as sister projects.

#### 4.2.4. Interim conclusion

As mentioned before, the main IMSs in focus of the JRP have been and still are *CAMPUSonline* at the University of Aachen, *FlexNow* at the University of Bochum, and *HISinOne* at the University of Wuppertal. All three IMSs do not have built-in functionality to access data of the data base infrastructure directly. Conversely, the three data stewards (CLS, ZfW, and QSL) depend on the services of their data custodians, who are partly university-internal custodians, partly university-external ones.

As a result, data acquisition is not so much a fluent process from the sources into the data warehouse, but more like struggling between different stakeholders. A priori, all available data is of interest in the project, especially in the exploring stage which aims to identify the data needed for analysing the SLC and working out appropriate recommendations for students and designers. However, most or even all custodians did not grant full access to their IMSs; reasons for this vary. Instead, the custodians pleased for a list of attributes that should be delivered (either by file dump, SQL view, or other transmission possibility). An appropriate list of attributes in demand was difficult to create, because only the data custodians and the data stewards not of the AISB, but of the responsible departments (usually of the [office of student affairs \(OSA\)](#)) had an adequate knowledge of the attributes used in the IMSs. We started an iterative process where two stages alternated: finding out about available attributes and demanding these attributes (that includes approval and transmission).

Only focusing on the core attributes, i.e., those attributes that are mandatory to represent the SLC, three teams in work package 4 worked on three different data dictionaries and the corresponding entity relation diagrams to create attribute lists, unify (or harmonize) them, check the demand of these attributes in the other work packages and list the attributes that are still in demand but not yet available, and starting this process in the next iteration. All this was accompanied under legal and ethical aspects, of which the legal aspects were slowing the whole process down, because all stakeholder (especially custodians and responsible departments) were anxious about all processes being judicially approved.

To describe this iterative process between stewards and custodians could fill an extra chapter, but nothing would be gained. We just wanted to give a feeling for the environment in which the DRM was (and still is) developed. Looking into books about creating a DRM, e.g., S. Sumathi ([2007](#)) or West ([2011](#)), the authors write on the assumption that all available sources are open to the data model creator and all attributes in demand are known and familiar from the beginning. The initial point in our project was somewhere between dynamic and chaotic, but everything else than like in the textbooks.

Please consider this subsection more like a comment.

<sup>12</sup><https://cls.rwth-aachen.de/cms/cls/Services-und-Projekte/~wrrcc/RWTH-Analytics/?lidx=1> (31.03.2023)

### 4.3. Preliminary models

In our first iteration loop, we did not develop a DRM but exchanged ideas and concepts we had about the creation of a DRM. Two main models were presented and discussed in this phase; both had no official name, but we will name them the ‘three objective model’ and the ‘normalized model’. The discussion on these models lasted around till May 23rd, 2022.

*Remark.* Remember, that there is not only one *data model* regarding a [data warehouse \(DW\)](#), but several. A DW will offer different *data models* or *data schemes* to different stakeholder. The interface for inputting data into a DW will provide a *data scheme*. Maybe the [staging area](#) of the DW will provide a scheme on its own. The (main) storage of a DW provides a scheme, often so extensive that [analytic engines](#) cannot efficiently operate on that scheme. So, DWs offer special *data schemes* derived from the storage and adapted to the requirements of the data processing engines or applications. Even if there are several, quite different *data schemes*, the term DRM always refers to the main *data scheme*, i.e., the *data scheme* of the storage of the DW. The same holds in our context if we talk about *data schemes*, *data models*, etc., without explicitly referring to a certain reference.

#### 4.3.1. The Three Objective Model

The three objective model has three objectives respectively main entity sets, namely

- an entity set for people, generally speaking, all persons, regardless if they are a student, a lecturer, or someone else,
- an entity set for study courses respectively the SLC, and
- an entity set for degree programs, including examination regulations, module compendium, etc.

The idea by these three entity sets would be, that a study course is a junction between a student and a degree program. Dividing into these three pillars, this model has the advantage of

- recording any person, not only students,
- recording any degree program, even if no student is enrolled in it,
- recording by the degree program records additional data as number of legal attempts, etc.,
- modularizing the SLC, meaning the SLC considered as junction of a student and a degree program, enables the potential to perceive achievements of courses or modules as junction between students and modules of degree programs, consequently assigning achievements to different study courses if necessary, and
- even recording achievements that do not belong to any degree program (yet).

Consequently, between the objectives person and study course would exist two relations: on the top between the person and the study course on the whole, and on the bottom between the person and the achievements of a study course. The same relations would hold between study course and degree program, precisely on the top between these twos on the whole, and on the bottom between achievements on the side of the study course, and modules on the side of the degree program.

A metadata entity set would complete this model. The metadata entity set would consider that not every study course is a simple junction between a student and a degree program, but may be more complex, i.e., the junction between a student and several degree programs. Figure 4.4 shows this model. At the time, the designing progress was not that defined as now, meaning the terminology is quite confusing: students study progress is the same as study course, and study course is the same as degree program.

Regarding the three pillars, the designing of this model goes into detail – even by two different versions. One version shows a set of entities that could be used to reflect a person, a study course, and a degree program. Interesting in this version is, that it considers the study course of a student as a copy of a degree program – with the difference, that the ‘copy’ is filled with ‘life data’, i.e. exam attends, achievements, or the study progress of a student. At the bottom right we see a new entity called course (German: *Veranstaltung*); this was the first attempt to link this model to the course catalog of the university, thinking further to integrate course and lecturer data, at which lecturer would be persons, too, closing the circle to the first pillar containing data of persons. This would be the second remarkable point on this model, that it differentiates between students and persons, making the model ready to include other persons than students. The result of these ideas can be seen in Figure 4.5

The design process of this very first draft ended by loosely assigning some standard attributes to the entities of Figure 4.5. A related showcase can be seen in Figure 4.6. One of the core ideas of the three objective model was the broad use of relations between entities. As we can see in Figures 4.5 and 4.6, every entity is linked in its entity set, classically by two relations, but the entities of the study course entity set are furthermore linked to at least one element of the degree program entity set and often to the student’s entity, too. The aim of this idea was, that one and the same achievement (an exam or a completed module) can be reused in different study courses, for example regarding a student studying Mathematics and Physics in parallel.

Even though work package 4 decided, such a schema would be too complex, parts of the schema can be discovered in the DRM version 1.

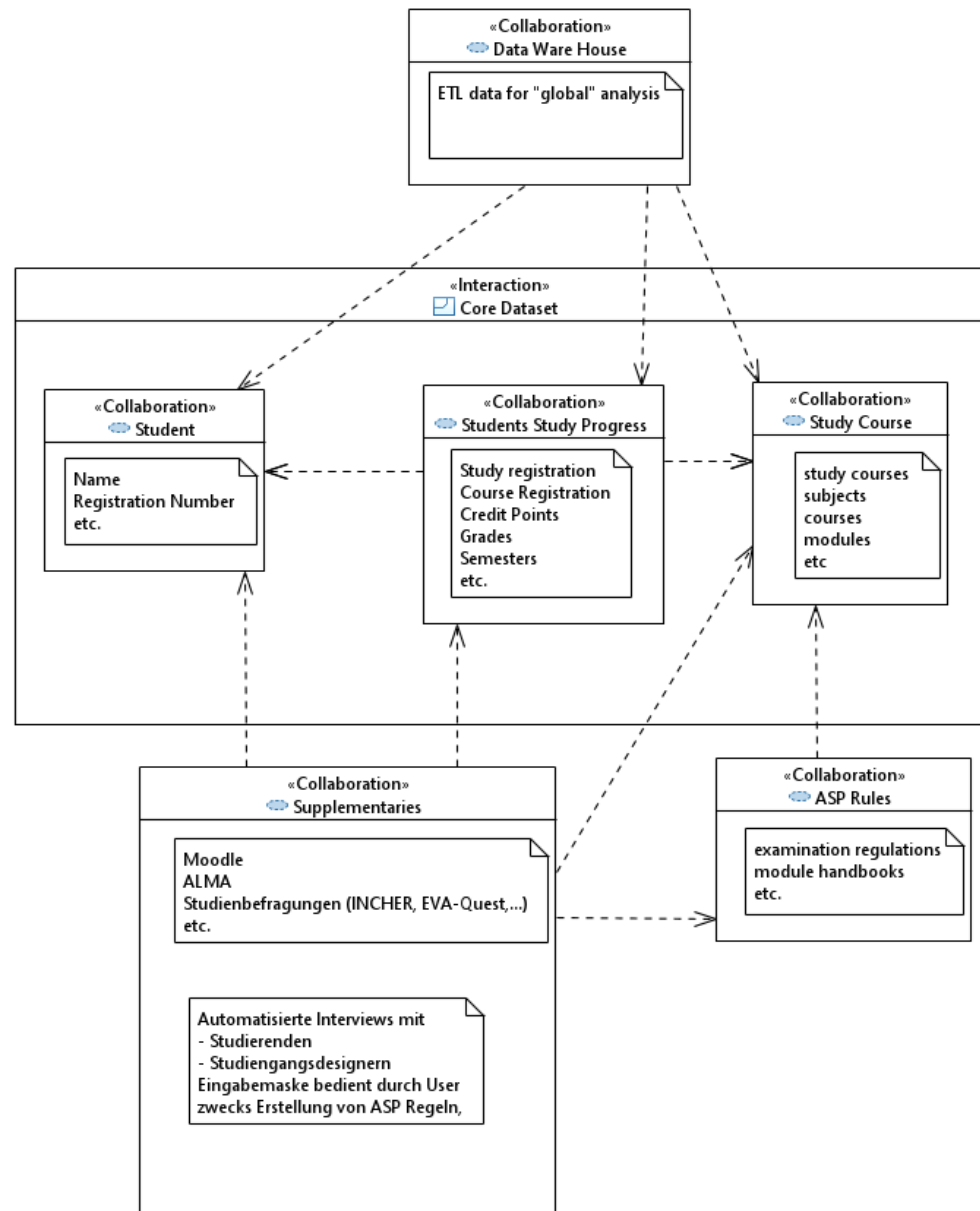


Figure 4.4.: Original design draft to the three objective model extended by an entity set for supplementaries (data from other management systems) and an entity set for collaborating with [ASP](#). The three 'pillars' are framed by '«Interaction» Core Data Set'.

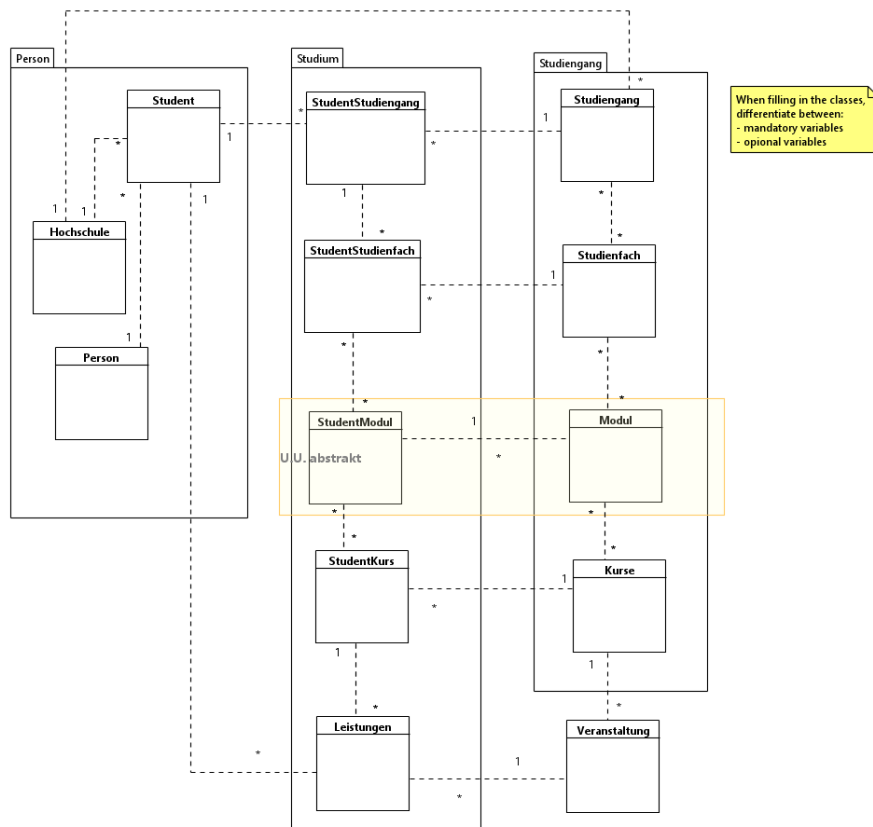


Figure 4.5.: Original design draft to the three objective model and the first arrangement of entity classes for the three entity sets (labels are all in German).

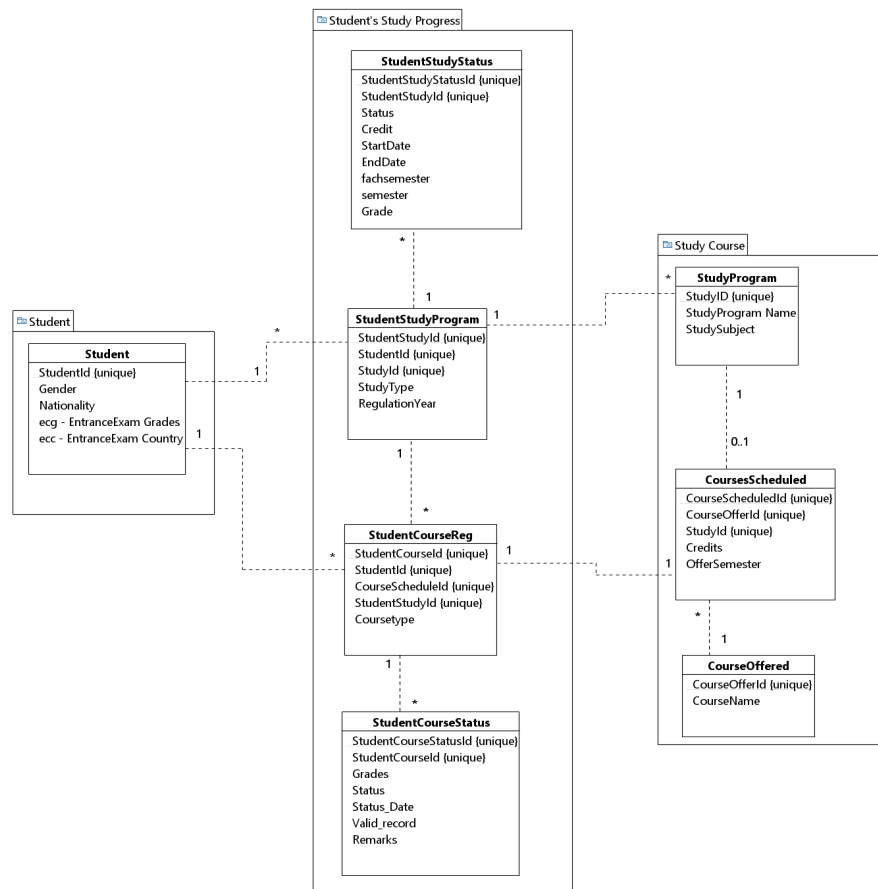


Figure 4.6.: First draft of an entity relation diagram with loosely chosen attributes to demonstrate the three objective model further (labels follow deprecated terms).

### 4.3.2. The preliminary model

Work package 6, responsible for student cohort tracing using PM (see also JPD in Section 4.1), already developed a DRM fulfilling the recommendations of their goal. A detailed description of this model and its challenges can be found in Florian Berthold 2022.

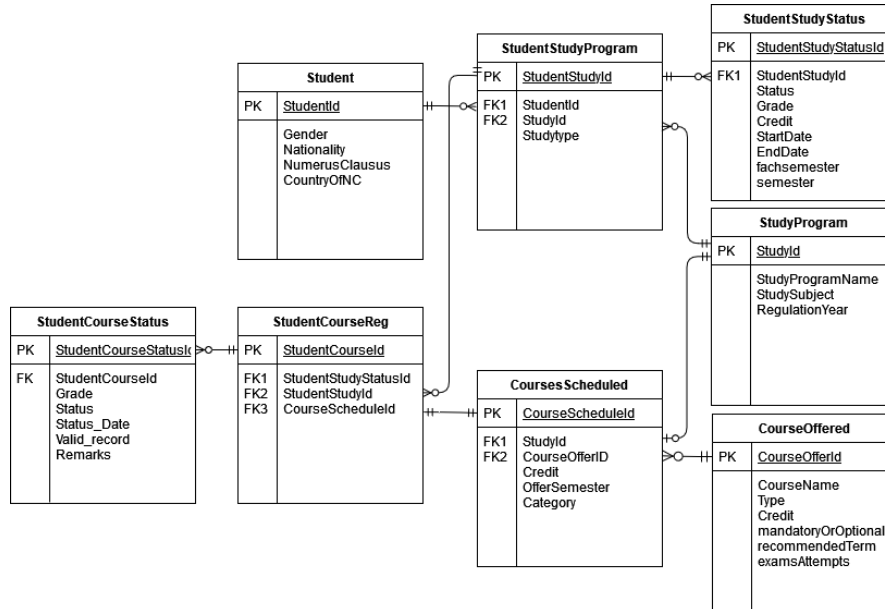


Figure 4.7.: The data model of work package 6, already in use by one of the ‘sister’ research projects.

This model was very advanced in its designing process due to the fact, that the model was originally created for the research project ‘Learning Analytics’. It is highly adapted towards an [Structured Query Language \(SQL\) data base management system \(DBMS\)](#) and fulfills the requirements of the third [normal form](#). The model included all important information for the SLC, even though further information were lacking.

This lack of information demonstrates quite good one of the most controversial subjects in AP 4. The description of AP 4 as written down in the JPD stated as one of the main tasks of AP 4 the designing and implementation of a DRM. The JPD did not define what data or which objectives should be represented by the DRM. Maybe, the best definition regarding the content of the DRM from the JPD is to design “a general definition of a data reference model for course of studies progresses”<sup>13</sup>. In this stage of designing the DRM, we had two major currents: to design the DRM to store as fewer data as needed to reflect the course of studies progress (like in the preliminary model), and to design the DRM to store as much data as possible making it the central storage model of the DW (like in the three objective model).

<sup>13</sup>“die gemeinsame Definition eines Referenzmodells von Studienfortschrittsdaten.” Persike 2021, 4. Methodisches Vorgehen und Zusammenarbeit



### 4.3.3. Approaches of an object-relational data model

#### Excursion to DBMS

The **data base model (DBM)** of a DBMS is not necessarily determined by the DRM. There are several DBMs; the most important are (Lemahieu, Broucke, and Baesens, 2018)

- Hierarchical model,
- Network model,
- Relational model (often associated with SQL),
- Graph model (i.e., a generalization of the network model),
- Multivalue model
- Object-oriented data base model,
- Object-relational model, and
- Document-oriented data base.

Even if it is not relevant at this point, we want to give a short summary of these models. Therefore, we skip the *hierarchical* and the *network model*, and continue with the more general *graph model*. The *graph model* stores data in *nodes* (e.g., in tables). Every node can be connected to any other; these connections are stored in *sets*. This allows very dynamic relations and one of the best known examples is *WikiMedia* (<https://commons.wikimedia.org/>). The content of this side is related to content of *Wikipedia* (<https://www.wikipedia.org/>) and else using the sets of a graph model.

*Relational models* are probably the best known models. Data is stored in tables, while every record has its own *primary key*. Records of one table are related to records of another one by assigning the primary key of the first one as foreign key to the second one. Contrary to the *graph model*, the relation is part of the record (i.e., an extra column in the table). More complex relations need extra relation tables, i.e., tables only storing the keys of foreign records. A generalization of this concept is the *multi-value model* repealing some restrictions of the *relational model*.

The *document-oriented model* just stores files or *documents*. There is a wide range of *document-oriented models*, but one of the best known is the *JSON-oriented model*, i.e., every document of the *JSON-oriented model* consist of *JSON* expressions. Relations between the different documents are possible, but only as appropriate entries in the *JSON* documents. That means, the user has all freedoms of the content to be stored (as long as it is valid *JSON*), but also has all responsibilities in administrating the documents – one missing id tag in a *JSON* expression and the document is ‘gone’.

Last but not least on our list, there are the *object models*, namely the *object-oriented* and the *object-related model*. The first one is more used internally in object-oriented programs using objects to store data. The later one is the transfer of the *object-oriented concept* to the *relational model*. Most important probably are the inheritance possibilities that exist in *object-related models*. A table can inherit from another (parent) table, forcing the user to generate a record in

the parent table for every record in the child table; additionally, template tables are supported in a more natural way than by *relational models*, forcing every new table to have a certain base structure.

We want to raise the reader's awareness, that there is not only the *relational model* and way more than just *SQL data base models*, because a lot of people are thinking in tables and foreign and private keys – all elements of *relational data base models*, but not of *graph models* having their relations in extra *sets*, or *document-oriented models* capable of changing there *data scheme* from document to document, or *object-related models* easily being integrated into object-oriented programs. So, it is not important to think about, how we can put our data into tables using a relational model, but more important to find the right model operating on our data!

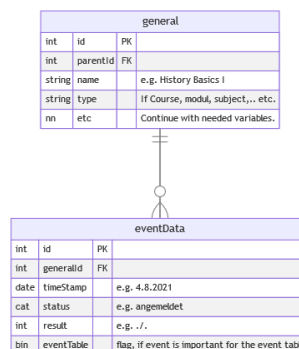


Figure 4.8.

A short essay about the [Connection between data base management system and data base model](#) can be found in Appendix C.

### Ideas about a object-related model

For a short time, there was the idea to use an *object-related model* for the DRM. The main idea on this approach was, that every entity class would have a time component: either related to a term or related to instant events respectively a date. A showcase of this ‘concept of tuple’ can be seen in Figure 4.8.

The main advantages of using an object-related model would be

- having functions on every entity class,
- directly accessing terms and events only by their parent class (no mix-up of events),
- a strictly schematic composition of all entities and standardized routines (functions) for handling them,
- not having the necessity, that a foreign key (a relation) has to refer only to a single entity, but to any other entity, as long as they have the same parent class, and
- tables do not have to be imported, but can natively be used as objects in programs and engines.

‘Parent class’ and ‘inheritance’ are terms of object-oriented programming. Hence, we do not explain them further.

For these advantages, we considered some use cases. The relations between the entities could be more dynamic, that means, some relations could skip entities as long as they are related to the same class. An example is shown in Figure 4.11 with a fictional parent class *studyUnit* (not seen in the figure). As long as *course*, *module*, *subject*, and *studyProgram* all inherit from *studyUnit*, we are free to relate data of the entity *course* to *studyProgram* or first to *modul*. In this way, we have more degrees of freedom than by classic SQL.

Also, it is possible to define entities (or better: classes) to sum up entities. It would be easily possible to create an entity *eventTable* summing up all events of all other entities – as long as those events have the same parent class respectively base structure.

A third showcase can be seen in Figure 4.10. ‘Childs’ of data could only consist out of related information, like the address information in the data container of a student. But they could also contain out of information important to an engine or a program. In this sense, the [examination regulations \(PO\)](#) of a degree program could be stored in the DRM linked to the same information, but this time in the way they are needed for [Answer Set Programming \(ASP\)](#). In turn, the ASP program would not have to translate the information into its own code to use it, but could natively load the information as classes and class instances into itself.

The conclusion on all this was, even if an object-relational data model would have certain advantages, the effort for designing, creating, and maintaining such a model – relations get more complex, functions have to be composed, references are highly sensible and with less control possibilities – was estimated to high compared to the benefit one would get.

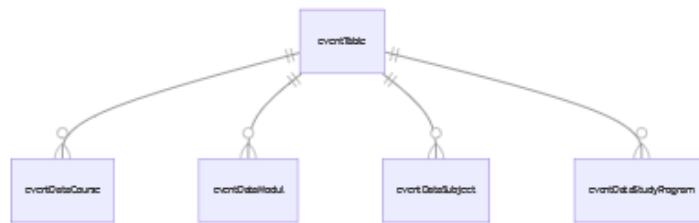


Figure 4.9.

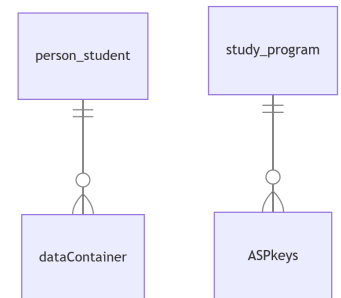


Figure 4.10.

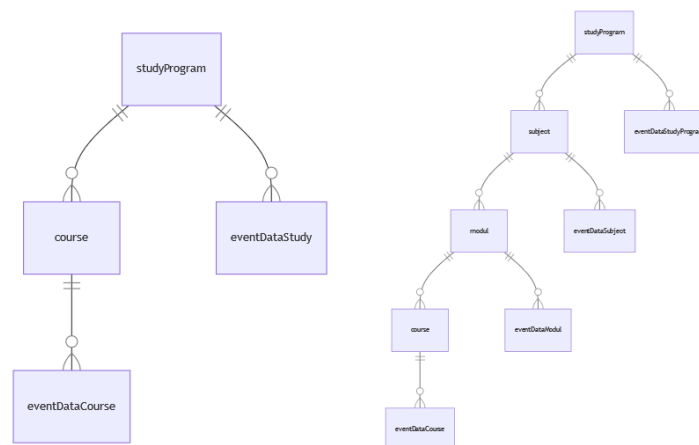


Figure 4.11.



## 5. Version One

The design process of version 1.1 of the [data base reference model \(DRM\)](#) was characterized by some external developments and basic decisions. Probably, the most important development was that all three project partners were provided with more or less substantial material from the data models of their [information management system \(IMS\)](#) by their data custodians. So we were able to start creating a [data accordance](#). The second development was that we agreed on a specific division of entity sets based on the preliminary considerations (see [Version Zero](#) in Chapter 4), without explicitly filling them with entities and attributes (that means, in the beginning we actually had an explicit set of objectives, see also Definition 3.1.3). The approach here was completely exploratory, i.e., without looking at the requirements of later analyses or utilization.

The local partners ([BUW](#), [RUB](#), [RWTH](#)) collected data items (i.e., attributes) using the data model information supplied by their particular [data custodians](#) and assigned them to one of the entity sets. The other partners checked if that item was also available in their particular IMSs – in keeping with the concept of data accordance. From case to case, all of us decided to which entity set the new attribute was assigned to, and if it was assigned to an existing entity, or if a new entity has to be created (depending on the relationship to other attributes). In this sense, the entity sets evolved until their final definition. Figure 5.1 demonstrates this process.

*First, we have a data item, turning into an attribute at the moment it is assigned to an entity.*

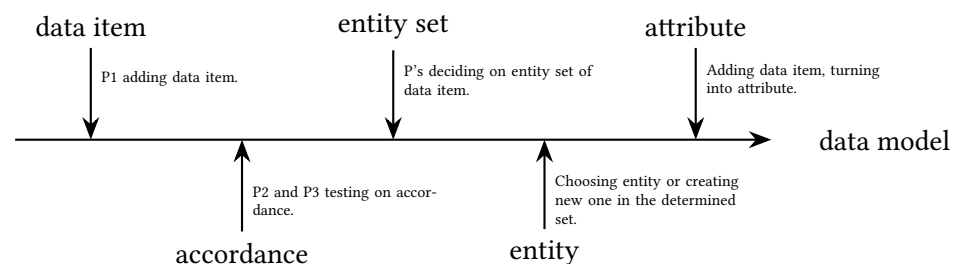


Figure 5.1.: Diagram showing how an attribute was integrated into the data model.  $P_1$ ,  $P_2$ , and  $P_3$ , respectively all  $P$ 's represent the [joint research project \(JRP\)](#) partners.

We will *not* illustrate how each attribute was integrated into the DRM (though we provided Figure 5.1 for this purpose), as well as we will skip all versions but the final one (*version 1.1*). Below, a short passage will be dedicated to the process of item acquisition and data accordance. Then, we will present each *entity set*. The chapter will end with two special sections: first, a section about the entity set of attributes regarding *degree programs*. This entity set was never finished in *version 1.1*. Second, a comment about other IMSs beside [campus management system \(CMS\)](#) (like *Moodle*) and their usage in the project.

## 5.1. Item acquisition and data accordance

The first step of our data accordance was defining objectives or entity sets which we expected to fill with a priori unknown attributes. Based on our preliminary considerations (see Chapter 4) we thought of six objectives, namely

- *individual*, i.e., all information of a person not related to a distinct [degree program](#) (e.g., name, address, but also enrolment at university),
- study program respectively [course of studies](#), i.e., all information of a person regarding a distinct degree program (e.g., enrolment to a degree program, lecture participations, achievements),
- study *term*, i.e., all information related to a term but not to a distinct person (e.g., start and end date of a term, courses, lecturers of courses),
- study scheme respectively *degree program*, i.e., all information of [examination regulations \(PO\)](#) and [module compendium](#) of a distinct degree program plus all exceeding information (e.g., compulsory [modules](#), elective modules, regular study period),
- *supplements*, i.e., all information that did not belong to the preceding objectives (e.g., information about campus libraries and book lending by degree program), and
- *missing items*, i.e., information that would be beneficial to have but does not appear in any data documentation (e.g., job occupation during the course of studies, knowledge level of the student).

While designing the first version of the DRM, not all project partners had full or even limited access to the data of their IMSs. But all project partner did have access to [data dictionaries](#), [ER-diagrams](#), or similar, supplied by their data custodians. We created an Excel file with three sheets, each for every [project partner](#), together with a sheet for each objective.

The sheets for each project partner had the function of collecting information about available data items. We see an example of such a sheet in Table 5.1. Without going too much into detail, we quote some key points of the collection excerpt.

- The first column shows the mapping function. If the *uniqueID* is used on any other item, whether at the other collection sheets or the sheets intended for the objectives, these items are mapped to each other.
- The columns *Variable*, *Label*, *Group*, *Source*, and *Institution* were used to describe the item and to support the collection process.
- The columns *optional* and *privacy-protected* had nothing to do with the actual collection process, but would be useful in later steps (keywords: usefulness and protection of data).
- Here, *Scope* is another term for *objective*, while *Comment* contains information for the mapping of the items, e.g., that registration number has to be made anonymous before mapping.

*These processes did not really happen sequentially, but simultaneously.*

*Here, we use the old technical terms before their standardization.*

After collecting all relevant items the project partners could identify in their IMSs, each item was assigned to one of the five objectives (remember, the sixth objective collected desired but missing items, so no existing item was assigned to this objective). There was no distinct rule set determining the mapping of items to objectives. In some rare cases, we rearranged the assignments. But we had some central questions giving orientation in order to support the assignment process. See Table 5.2 for these questions.

| objective                  | central questions                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| individual                 | <ul style="list-style-type: none"> <li>• Is the item related to a person?</li> <li>• Will the item be unaffected by a change of study program/-course of studies?</li> </ul>                                                                                                                                                                                                                                              |
| study program <sup>1</sup> | <ul style="list-style-type: none"> <li>• Does the item concern a course of studies?</li> <li>• Is the item related to a person?</li> <li>• Is the item related to a study scheme/degree program?</li> <li>• Is the item part of the <a href="#">student life cycle (SLC)</a>?</li> </ul>                                                                                                                                  |
| study term <sup>2</sup>    | <ul style="list-style-type: none"> <li>• Is the item related to a distinct term?</li> <li>• Is the item related to a distinct <a href="#">course</a>?</li> <li>• Is the item <i>not</i> related to a student?</li> </ul>                                                                                                                                                                                                  |
| study scheme <sup>3</sup>  | <ul style="list-style-type: none"> <li>• Is the item related to a degree program?</li> <li>• Is the item a regulation or part of one?</li> <li>• Is the item a module or part of one?</li> <li>• Is the item a course description?</li> <li>• Is the item <i>not</i> related to a person?</li> <li>• Is the item <i>not</i> related to a distinct term?</li> </ul>                                                        |
| supplements                | <ul style="list-style-type: none"> <li>• Is the item available?</li> <li>• Is the item <i>not</i> exclusively related to a person?</li> <li>• Is the item <i>not</i> part of the necessary set of items to represent the SLC?</li> <li>• Is the item <i>not</i> part of the degree program, i.e., the PO and the module compendium?</li> <li>• Is the item <i>not</i> an immediate part of the course catalog?</li> </ul> |
| missing items              | <ul style="list-style-type: none"> <li>• Is the item required?</li> <li>• Is the item not yet available?</li> </ul>                                                                                                                                                                                                                                                                                                       |

Table 5.2.: Central questions for assigning new items to an objective respectively an entity set. A positive answer indicates the objective.

After assigning an item to an objective, we had to choose an entity, so that the item would

<sup>1</sup>Standardized: course of studies.

<sup>2</sup>Heavily related to the course catalog.

<sup>3</sup>Standardized: degree program.

become an attribute of the assigned entity. We structured the entities according to four simple rules:

- Each objective had a ‘head’ entity.
- Every item was attached to its related entity (which resulted from the content of the item).
- If two values of the same attribute had to be assigned to the same entity (that is not possible – all attributes of a single entity instance must have a unique or no value), a new entity was constructed (that would have two instances containing each value) together with an  $1:n$  relationship.
- Entities getting too large were split to enhance the structure of the entity set.

All this arranging and structuring was done in Excel, so that important information of the attributes could be denoted together with the entity-relationship-structure and everyone had a chance to participate in this process without being excluded by some technical barriers. Table 5.3 shows as an example the notation of the entity ‘Person’. We see again the unique id like in 5.1 and the privacy-protection and mandatory characteristics. Also variable name, label, and type are mentioned, but here they are standardized for all three locations. The scope represents the entity, while example and reason of use helps to clarify, why we decided to include the attribute. Last but not least, further descriptions and comments complete the list of attribute properties.



| uniqueID | Variable       | Label                    | Type | Group                    | Source   | optional   | privacy-protected | institution | Scope                                | Comment                                   |
|----------|----------------|--------------------------|------|--------------------------|----------|------------|-------------------|-------------|--------------------------------------|-------------------------------------------|
| ix0003   | person_id      | Studierenden ID          | int  | Persönliches             | HISinOne | Mandatory. | ?                 | BUW         | Personal Student/Student Life Circle | Pseudon. durch Mid-ware.                  |
| ix0002   | Matrikelnummer | -                        | int  | Persönliches             | HISinOne | Mandatory. | True.             | BUW         | Personal Student/Student Life Circle | Sinnig zum Matchen unterschiedl. Quellen. |
| ix0004   | geschlecht     | -                        | cat  | Persönliches             | HISinOne | ?          | True.             | BUW         | Personal Student                     | -                                         |
| ix0005   | geburtsdatum   | -                        | dat  | Persönliches             | HISinOne | ?          | True.             | BUW         | Personal Student                     | -                                         |
| ix0007   | hzb_typ        | Typ der HZB.             | str  | Persönliches/Universität | HISinOne | ?          | True.             | BUW         | Personal Student                     | -                                         |
| ix0010   | hzb_note       | -                        | num  | Persönliches/Universität | HISinOne | ?          | True.             | BUW         | Personal Student                     | -                                         |
| ix0012   | hzb_kreis      | Ort des Erwerbs der HZB. | str  | Persönliches/Universität | HISinOne | ?          | True.             | BUW         | Personal Student                     | -                                         |

Table 5.1.: An excerpt of the item collection sheet of the [University of Wuppertal \(BUW\)](#).

| uniqueId | variable    | label                    | type         | example       | privacy | mandatory | reasonOfUse                        | scope    | description                     | comment                            |
|----------|-------------|--------------------------|--------------|---------------|---------|-----------|------------------------------------|----------|---------------------------------|------------------------------------|
| ix0001   | prId        | ID of person             | integer      | 123456        | n       | m         | x                                  | ixPerson | Id. of data set                 | .                                  |
| ix0044   | prTitle     | Title of person          | string       | Dr.           | ?       | o         | Indicator of prev. studies.        | ixPerson | The title of a person           | Perhaps empty info. for students.  |
| ix0004   | prSex       | Sex of person            | categorical  | d             | ?       | o         | Ratio of gender.                   | ixPerson | m = men, w = woman, d = diverse | .                                  |
| ix0005   | prBirthDate | Date of birth.           | date(d)      | 1999-04-15    | ?       | o         | Age distribution.                  | ixPerson | Birth date of person.           | obfuscated by reducing on year.    |
| ix0006   | prNation    | Nationalities of person. | list(string) | [Deutschland] | ?       | o         | Attractivity of university abroad. | ixPerson | List of the nationalities.      | obfuscated by reducing on regions. |

Table 5.3.: An excerpt of the attribute's description sheet of the entity 'ixPerson'.

## 5.2. The entity sets of the data model, version 1.1.1

Next, we will present each objective respective entity set using ER-diagrams. We will illustrate the entities in short detail, but not every single attribute. More information about the entity sets of the DRM version 1.1.1 can be found in the Appendix, precisely at Section D, [ER-diagram based on the data dictionary version 1.1.1 – published 16.09.2022](#), and Section E, [Das Daten-Referenz-Modell und die Clearingstelle – a presentation released at 16.08.2022](#).

### 5.2.1. Entity set ‘Personal’

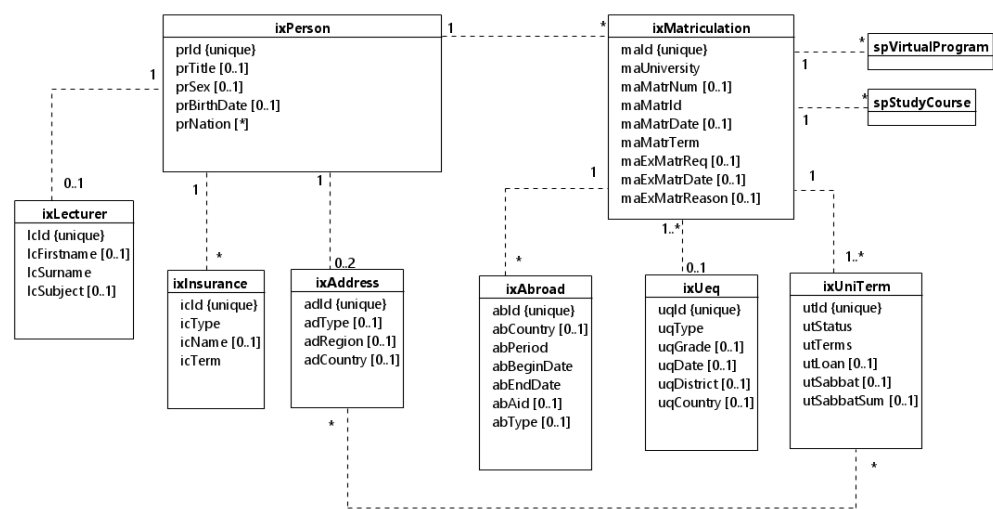


Figure 5.2.: ER-diagram for the entity set ‘Personal’.

The ‘head’ entity (see above) of this set (Figure 5.2) was *ixPerson*, while all entities starting with *ix* belong to this set. The remaining entities had the following intent:

- *ixLecturer* was reserved for the case that together with course catalogue’s lecturers would be integrated into the DRM. This entity was special in this set because all other entities belong to students’ data, but *ixLecturer* would have been a connection between the set *Personal* and the set *Course Catalog*.
- The entities *ixInsurance* and *ixAddress* would have contained only private, i.e., for course of studies irrelevant, students’ data.
  - *ixInsurance* should have been differentiated into statutory and private insurance, presuming performance differences between these groups.
  - *ixAddress*, differentiated by parents’ address and address during term, should have given an indicator of students’ mobility.
- *ixMatriculation* combined all students’ data *not* related to a particular course of studies.

- *ixMatriculation* would have contained the university a student was visiting; his<sup>4</sup> registration number; his registration date and term; and his de-registration together with the attendant date and reason.
- *ixAbroad* would have contained all information about stays abroad, to determine the best point in study for such a stay.
- *ixUeq* would have contained information about where and when someone achieved his university entrance qualification.
- *ixUniTerm* would have contained additional information such as university terms of the student or sabbaticals they have done or their student status<sup>5</sup>
- The remaining two entities, *spVirtualProgram* and *spStudyCourse*, do not begin with *ix* and are not part of this entity set. They are only pictured to show their relationship to *ixMatriculation*.

### 5.2.2. Entity set ‘Course of Studies’

The ‘head’ entity of this set (Figure 5.3) was *spStudyProgram*, while the *sp* marked all entities starting with *sp* belonging to the same set. The remaining entities had the following intent:

- *spStudyProgram* would have contained all ‘formal’ information of a course of study and the study progress: name of course of studies, aspired degree, status of student, grade (so far), credits (so far), term of study, current term and date, etc.
- *spVirtualProgram* would have been an overhead, summing up and bringing together various course of studies; e.g., the double major master of Education can be combined with a second course of study (*Ergänzungsstudium*), i.e., a third major subject<sup>6</sup>. The local IMSs do not merge these two courses of studies (the double major and the extra subject). This would have been done artificially by *spVirtualProgram*.
- *spStudyField* would have contained information about the field of studies, i.e., the name of the examination regulations specific for this field and the college or school that administers the examination regulations and achievements regarding the field.
- *spStudyCourse* would have contained all information about courses regarding the study program. In this context, *spStudyCourse* had two different meanings: first, the actual course like lectures, exercises, etc. Second, modules and groups summing up courses in respect of the examination regulations. Name, type, and attribute specified the kind of entity instance; credits and grades reflected the achievement of the student; recommended term, profile and repetition contained additional information.
- *spCourseEvent* would have saved the single stages a study course passed, like registration to a course or an exam, attendance, result, etc. Most important was the fact that every event was dated.

*Because of a lack of standardization at this stage, the two terms field and subject are used synonymously.*

<sup>4</sup>Please complete here and in the following passages: his or her.

<sup>5</sup>Meaning (in German): *Haupt Hörer, Zweithörer, Gasthörer*, etc.

<sup>6</sup>This example is illustrated in the Appendix, Section F, [Bachelor degree program with three major subjects](#).

Below we will see, that the entity sets *ssStudySchema* et alia were never realized.

- The ER-diagram includes some entities of foreign sets, namely *ixMatriculation*, *ssElement*, *ssGeneralField*, *ssStudyScheme*, *stCourseTerm*, and *stStudyTerm*. These are explained below.

A few words about the logic of this entity set: the central entity was *spStudyProgram*, that contained all information about which course of studies a student was attending. Per term and student's course of studies, there would have been one instance of *spStudyProgram*, and as a result, each instance was mapped to a certain term (*stStudyTerm*) and examination regulations alias degree program (*ssStudyScheme*). All instances of *spStudyProgram* related to a specific student's course of studies were gathered by an instance of *spVirtualProgram*, together with further courses of studies if necessary (keyword: threefold major degree). The *spVirtualProgram* was mapped to a specific student (*ixMatriculation*).

The *spStudyProgram* was further specified by *spStudyField* which was mapped to its counterpart of the examination regulations, namely *ssGeneralField*.

A peculiarity was the entity *spStudyCourse*. It contained the achievements of a student and was related to three further entities: to *spStudyProgram* thus to a specific student's course of studies

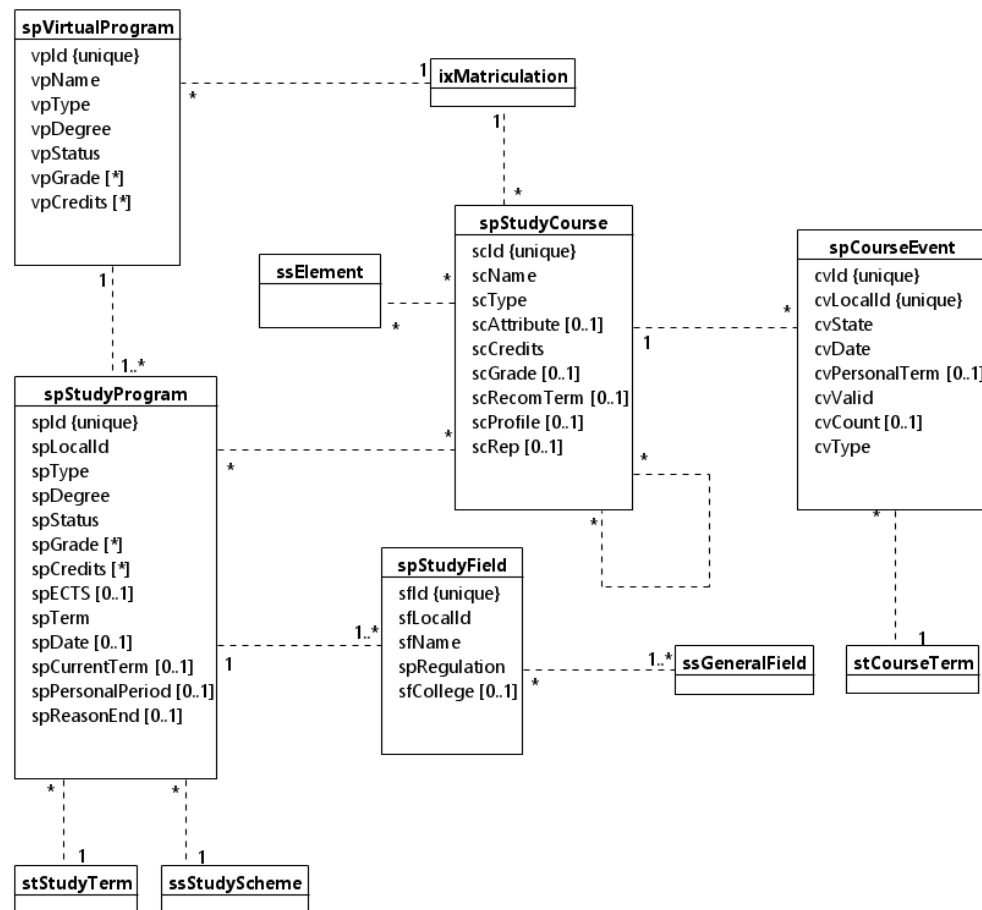


Figure 5.3.: ER-diagram for the entity set 'Course of Studies'.

and term; to *ssElement* thus its counterpart of the examination regulations; and to *ixMatriculation*, meaning that an achievement is not exclusively bounded to one *spStudyProgram*, but can be reused for other courses of studies.

A second characteristic of *spStudyCourse* was its recursive relation. So it is possible to have several instances, e.g. module, lecture, exam, related to each other. Modules consist out of one or more courses, and each course can also have several instances, like a lecture can be related to exam and resit.

Last but not least, *spCourseEvent* gave a ‘historical’ description of *spStudyCourse*. Tracking different status at different dates made it possible to analyse the data by time-sensitive techniques like [Process Mining \(PM\)](#).

The close relationship between course of studies and the examination regulation was a result of the considerations of the *Three Objective Model* (see Subsection [4.3.1, The Three Objective Model](#)).

### 5.2.3. Entity set ‘Course Catalogue’

This entity set (Figure [5.4](#)) should reproduce the course catalog by term of a university. Thereby, we would have reached the triad of a course, i.e., three entities as representation of a course and all related to each other:

- The representation of a course by an attending student, as known as the entity *spCourseEvent*.
- The representation of a course by its counterpart in the examination regulations, as known as the entity *ssElement*.
- The representation of a course by its occurrence in the course catalog, as known as the entity *stCourseTerm*.

The entity *stCourseTerm* is the central element in the entity set [course catalogue](#). Beside name and type (lecture, exercise, etc.) of a course, it should have been related to a certain term (*stStudyTerm*), that of course would have been related to any other term-dependent entity. And *stCourseTerm* would have been related to a lecturer or an administrative person, here called *stCoursePerson*. *stCoursePerson* would have been an extension of the already existent *ixPerson* – therefore the relation between both entities.

Originally, a more complex model was envisaged, representing course compositions, modules, subjects, and further details, as a more complex structure for the lecturer. As we will repeat in the chapter regarding version 2, we agreed in [work package \(AP\) 4](#) on the fact that the course catalogue has no immediate importance regarding the SLC. In fact, the course catalogue is central for the recommendation system in the [Study Buddy](#) and is inside the reference of AP 2. For this reason, the model to reproduce the course catalogue was kept very basic (just term, course and lecturer), and was entirely excluded in later versions of the DRM.

### 5.2.4. Entity set ‘Supplements’

This list is not meant seriously, but shows part of a student’s data footprint.

The entity set *Supplements* (Figure 5.5) should have contained any information not directly involving the three topics SLC, PO, and course catalogue. This could have been anything linked to a student’s [data footprint](#): eating habits, presence on campus, log-in dates to learning management systems, personal internet profiles.

One supplementary information was considered as a real benefit, that are data regarding student’s book lending. Theoretically, particular books are lent by students regarding their courses. By this link (i.e., the student), we could map books to courses, but not any books – exactly the specific books gaining an advantage for passing the course related to it. In conclusion, we could recommend a book list to all students depending on the courses they are attending.

As an example, we designed by the entity set *Supplements* a structure respectively a set of entities that could have reflected the collection of book lending data. Even though we know about the existence of the data at each of the three locations (due to the need of a library management system at each location), we never had access to any of these systems or the data they contained.

The entity set contained out of five entities:

- *smLibrary* represented the library.
- *smFacility* represented the facility of the library, so that locality dependencies could be tracked.
- *smBook* would have contained a list of all books of a library, respectively those with a link to students or courses.
- *smLoan* would have tracked the time a student was lending a book. Of course, this entity was linked to *ixPerson* representing a student.
- *smReserved* would have tracked the time a book was claimed for a certain course (meaning, it is open to anybody but cannot be lent). Again, this entity was linked to *ixPerson* representing the lecturer who claimed the book.

Lecturers can claim books for their courses which all together are called Semesterapparatur.

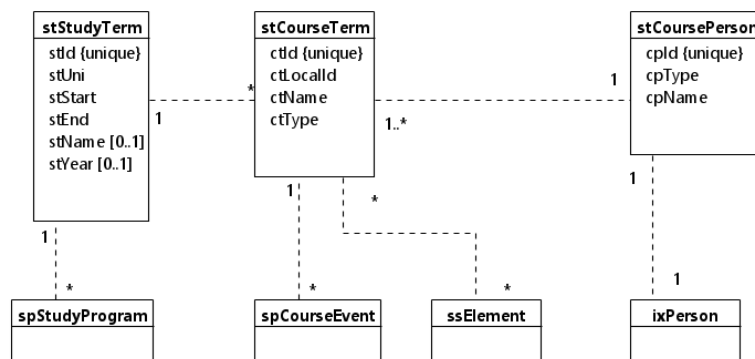


Figure 5.4.: ER-diagram for the entity set ‘Course Catalogue’.

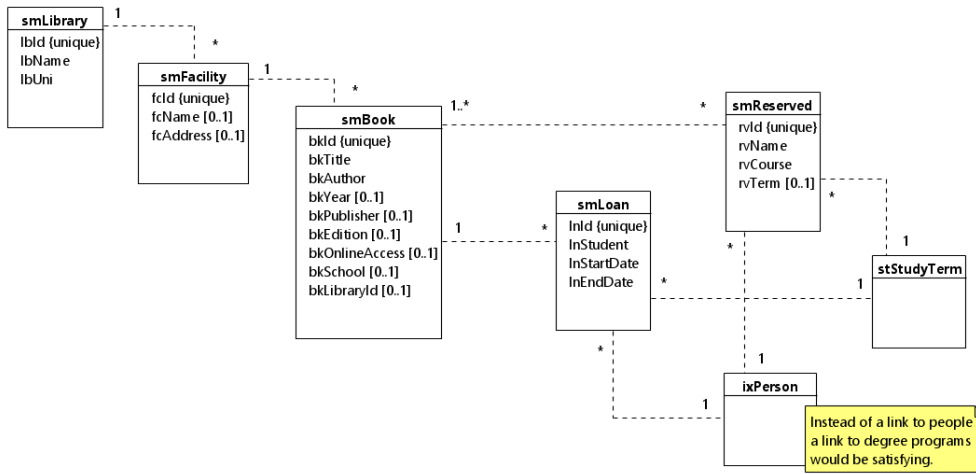


Figure 5.5.: ER-diagram for the entity set ‘Supplements’.

### 5.2.5. Entity set ‘Missing Data’

The last entity set (Figure 5.6) was about characteristics we wish to have in our data, but certainly and at no point could achieve. Two entities add up to this entity set.

- *miOccupation* should have tracked prior occupations before enrolment at the university, especially professional qualifications.
- *miKnowledge* should have tracked the knowledge level of the student before enrolment at the university.

As described in Section 5.1, we gathered just any item, variable, attribute, feature, or characteristic we could think of. Consequently, this entity set arose from entities of interest regarding the SLC, but without any chance to be realized by reason of missing data.

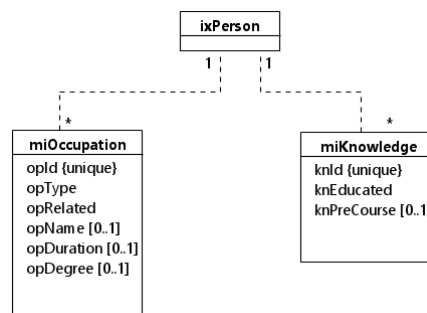


Figure 5.6.: ER-diagram for the entity set ‘Missing Data’.

*Supplements represents existing, but inaccessible data; missing data is in contrast not existing data.*



### 5.3. Special Case: further information systems

Ignoring the entity sets *Supplements* and *Missing Data* (both of which were only theoretical in origin), all of our entities were related to one and only one information management system, namely the system containing all examination regulations and achievements of a student. These systems are also called CMSs (for the IMSs involved into the JRP, see Table 4.1).

Of course, there are other IMSs involved at the universities. *Moodle*<sup>7</sup> is an **learning management system (LMS)** to accompany students in their courses. It has features for file storage, a discussion and message forum, course tests, and more. The most interesting point, *Moodle* is in operational usage at all three locations of the JRP partners.

Consistently, the data contained in this LMS has to be included into the DRM. Unfortunately, the time and effort required to prepare data from *Moodle* is extremely high. While examination regulation and achievement data is standardized to a certain point, making it easy to join the data from the different CMSs, data from *Moodle* is very inconsistent. This is due to the following non-exhaustive reasons.

- Course names from PO and course names in *Moodle* do not have to be congruent.
- Some lecturers are using *Moodle* to interact with students, some are using it just to distribute material, and some are not using it at all.
- The data stewards of one of the JRP members are never deleting *Moodle* user logging and content data, others are deleting this data every term.
- The use of the ‘classical’ data of an SLC (e.g., exam attendance and achievements) is (more or less) comprehensively regulated by the legislator. The use of **learning analytics (LA)** data including data from *Moodle* is poorly regulated.

Integration of *Moodle* data should inevitably be the case. On the other side, the mentioned reasons show that an integration in an too early step of the project would jeopardize or at least delay it. The same is true for the data of the *library management systems* (no standardization and no legally described usage). These systems are peripheral data providers and will be targeted if the core data providers interact properly with the **data warehouse (DW)**.

Additionally, a note on this topic can be found in Appendix G, “**A note from GIT – AP04: Moodle (Issue 37)**”.

### 5.4. Special Case: examination regulations

As mentioned before, every course exists as a triple:

- in conjunction with a student (i.e., attendance or achievement),
- as an offering to students (from the course catalogue and possessing attributes like term, room, lecturer, etc.),

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<sup>7</sup><https://moodle.org/> (21.06.2023)

- and according to the examination regulations.

Figure 5.7 shows the relations of each component of this triple among each other as entity diagram. We point out, that courses by the examination regulations have to exist. Each course of the examination regulations can be related to one or more courses by the catalogue (e.g., to one course but of several terms). The other way round, each course of the course catalogue has to be related to at least one course of any examination regulations. But a ‘catalogue’ course can be related to several equivalences from the examination regulations (e.g., a maths course related to two different examination regulations like Economics and Sociology). The courses of students should always be related uniquely to one course from the course catalog and to one specific set of examination regulations.

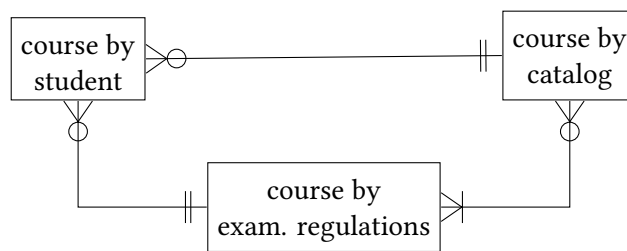


Figure 5.7.: Relation between the different aspects of a course.

Because of this closely relation between the triple of the nature of courses, the idea of including examination regulations into the DRM suggested itself.

Our first and simple attend (our *stage 1*) to describe examination regulations can be seen in Figure 5.8. We thought, four entities would be enough to reflect each examination regulations of every degree program.

- *ssStudyScheme* would have been the ‘head’ of this entity set. It would have contained degree, version of examination regulations, standard period of study, and credit points – a list of abstract parts. The degree program is divided into the single sub-subjects (for a double major degree, this would be first subject, second subject, educational sciences, and electives), and a list of actual parts of which a student can choose from (like English studies, German studies, and so on). Last but not least, *ssStudyScheme* would have contained a field called ‘perspective’ considering that for certain perspectives (educational career, science career, economic career, etc.) certain electives have to be chosen. *ssStudyScheme* would have been the counterpart of *spStudyProgram* of a student’s course of studies.
- *ssGeneralAttributes* would have been a container for attributes being valid for any degree program at a certain university. Such attributes are the name of the university or the exchange of credit points to ECTS.
- *ssGeneralField* was a very general entity. It represented a part of a degree program, as a group of modules, as a module, as a component of a module, as anything else that fits in. The last attribute of this entity listed all possible (direct) children of this entity, for example, all groups of modules that are associated to a certain part of the degree program, if the entity instance would represent this part. Then, two lists sum up all

Children represent the next recursive level, while required and optional modules always refer to the achievements at the end of recursion.

modules associated directly or indirectly to this entity instance. *gfReqMod* would have been the list of required modules, *gfOptMod* the list of optional modules.

- *ssCombinationRules* would have been several sets containing rules of the examination regulations, especially regarding the combining possibilities of the different modules. *ssGeneralField* and its recursion would have contained more modules than even possible to study, and the examination regulations provide instructions for allowed combinations.

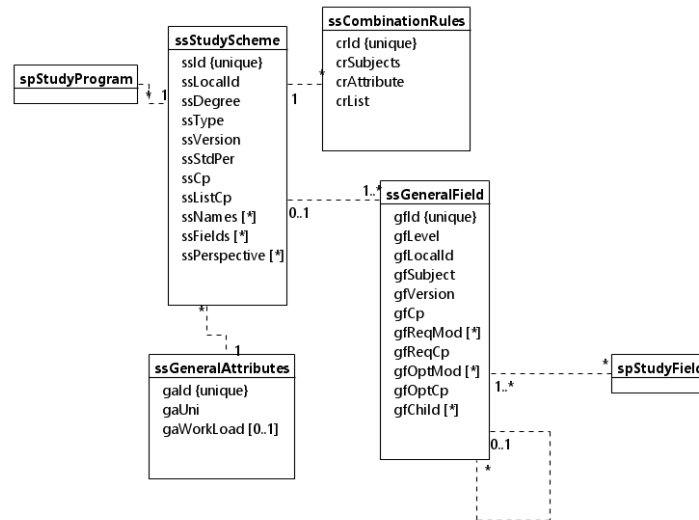


Figure 5.8.: ER-diagram for the entity set 'Examination regulations'.

We could explain a lot about the mechanism of recursion and how a set of examination regulations fit in there. But continuing at this point, we will see, that this model could not satisfy the demands of the reproducing process of the examination regulations. Therefore, we would describe for no purpose a deprecated entity set further.

The second stage or approach was the collection of different items to describe examination regulations. The process of item collecting was already described in Section 5.1. An extract of this collection can be seen in Table 5.4.

This list became very long even though it was non-exhaustive and very soon it became clear that the model from stage 1 never could reflect the attributes of examination regulations respectively the attributes from the list of stage 2.

The stages were not executed one after another, but in parallel. We worked on the entity set of stage1 while we collected items to typify the examination regulation, i.e. stage 2. After realizing that the entity set from stage 1 would not be satisfying, we proceed with stage 3.

Stage 3 was characterized by improving the first set of entities representing examination regulations in the way that a new set of entities would be capable of reflecting all of the items of the collection of the second stage and all potential items that would be collected in the future.

We used here a simple idea, not defining each entity needed, but using abstract entities capable of representing any attribute. Therefore, the entity set of examination regulations implied a tree where

- the root representing the degree program,
- a branch class representing any type of grouping, e.g., parts or profiles of degree program, or modules,
- a leaf class representing the last level, e.g., courses from the module companion.

The main problem of an abstract entity set is the plenty attributes for each entity. The 'program root' was in need of other attributes as a 'profile branch' as a 'module branch' as a 'course leaf'. Thus, every entity got an attribute node serving as a steward of the attributes in need. These last attributes were grouped in the entity 'attribute content' and depended on the 'tree entity' (i.e., root, branch or leaf entity, and moreover 'program root', 'profile branch', etc.).

The advantage of separating the attributes into a node and a content resulted into the opportunity of the attribute node to be related to more than one attribute content, i.e., the attribute contents were standardized and the attributes in need were related to the attribute node, thereby containing all attributes in need for a certain node of the examination regulations.

This concept is illustrated in Figure 5.9 on the left side. The root is labelled as '/program', the branches are labelled as '/field', and the leaves are labelled as '/element'. The container of possible attributes related to any node of the tree is labelled '/attrNode' and the actual attributes are labelled '/attrContent'.

Finally, there was the idea to be more abstract by a successive model just possessing one node serving for root, branch and leaf, and just possessing one attribute container. This model can be seen in Figure 5.9 on the right side.

*Field is in this context a term too narrow for the use of the branch, but the model was still in development when the illustration was made.*

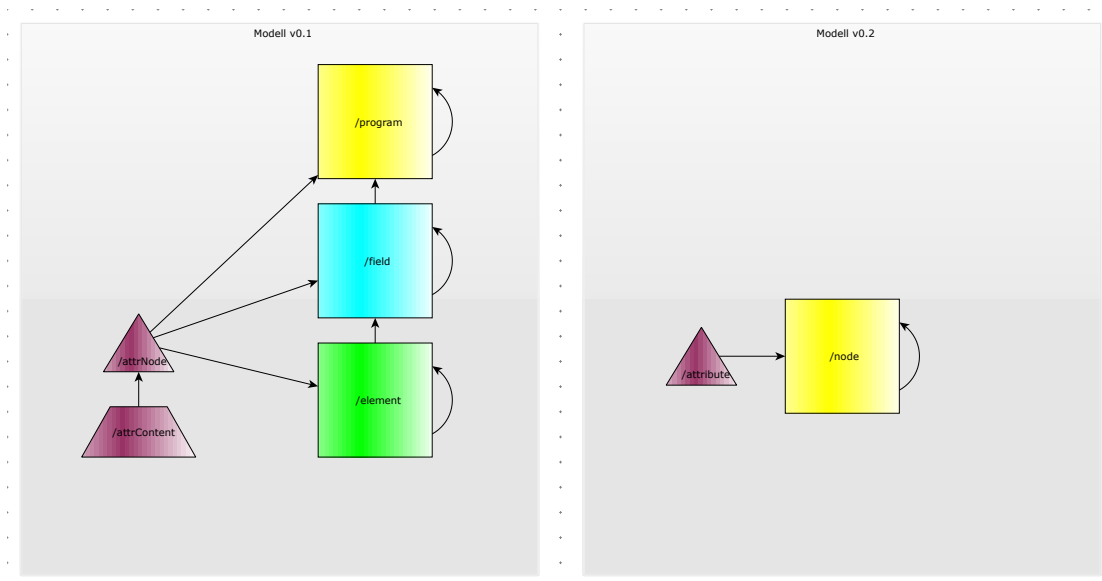


Figure 5.9.: The basic model of an abstract entity set reflecting the examination regulations.

A full description – rather most full description missing some attributes nodes necessary for a full description of examination regulations – can be found in Appendix, Section H, [The tree based mapping of examination regulations](#).

Finally, we stated two points on this process of developing a mapping for regulation examinations:

1. For storing any examination regulation a meta-language to describe examination regulations is needed like the one presented here (but improved to work on all regulations), and
2. this development process affects the area of AP3's responsibility in an extent, that it is doubtful if including the regulations into the data model lies in AP4's responsibility in anyway.

As a conclusion, the examination regulations were dismissed from the data reference model.

| Item                           | Beschreibung                                           |
|--------------------------------|--------------------------------------------------------|
| Abschluss Grad                 | Angestrebter Grad des Hochschulabschlusses             |
| Component Aufwand              | zeitlicher Aufwand (insgesamt)                         |
| Component Fachsem. Bedingung   | Vorges. Fachsemester zum Komponentenabschluss          |
| Component Fachsem. Empfehlung  | Empf. Fachsemester zum Komponentenabschluss            |
| Component Form                 | Veranstaltungs- bzw. Lehrform                          |
| Component ID                   | ID der Komponente (PO)                                 |
| Component Kennzeichen          | ID bzw. Abkürzung der Komponente (PO)                  |
| Component Name                 | Name der Komponente                                    |
| Component Pflicht              | Pflicht/Wahlpflicht                                    |
| Component SWS                  | ”zeitlicher Aufwand (nur ”Anwesenheit”)”               |
| Component Voraus. Bedingung    | ID der vorausgesetzten Komponente                      |
| Component Voraus. Empfehlung   | Kennzeichen der empfohlenen Komponente                 |
| Module Aufwand                 | zeitlicher Aufwand (insgesamt)                         |
| Module Fachsem. Bedingung      | Vorges. Fachsemester zum Modulabschluss                |
| Module Fachsem. Empfehlung     | Empf. Fachsemester zum Modulabschluss                  |
| Module Gewicht                 | Gewicht der Note                                       |
| Module Group Erwerb LP         | Leistungspunkte, die erworben werden müssen            |
| Module Group ID                | ID der Modul-Gruppe                                    |
| Module Group Name              | Bezeichnung der Modulgruppe                            |
| Module Group Pflicht           | Pflicht/Wahlpflicht einer Modulgruppe                  |
| Module ID                      | ID des Moduls                                          |
| Module Kennzeichen             | Kennzeichen/Abkürzung für das Modul                    |
| Module Komponenten             | Anzahl der Komponenten, die das Modul umfasst          |
| Module LP                      | Leistungspunkte                                        |
| Module Name                    | Name des Moduls                                        |
| Module Pflicht                 | Pflicht/Wahlpflicht                                    |
| Module Voraus. Bedingung       | ID der vorausgesetzten Komponente/Modul                |
| Module Voraus. Empfehlung      | Kennzeichen der empfohlenen Komponente/Modul           |
| Program ID                     | ID des Studienganges                                   |
| Program Perspektive            | ”Perspektive, mit der das Studium studiert wird”       |
| Program Studententyp           | Struktur des Studienganges                             |
| Proof Benotung                 | Wird der zu erbringende Nachweis benotet?              |
| Proof Dauer1                   | Nachweis wird an einem Tag erbracht                    |
| Proof Dauer2                   | Nachweis erfolgt über mehrere Wochen                   |
| Proof Form                     | Form, in der die MAP oder UBL erbracht wird            |
| Proof ID                       | ID der Modulabschlussprüfung                           |
| Proof LP                       | Anzahl der erworbenen LP                               |
| Proof Note                     | Note, mit der der Nachweis benotet wurde               |
| Proof Umfang                   | einmaliges Event (Klausur etc.)                        |
| Proof Voraussetzung Bedingung  | Bedingung, die für Prüfungsanmeldung erfüllt sein muss |
| Proof Voraus. Bedingung ID     | ID eines bedingten Nachweises                          |
| Proof Voraus. Bedingung LP     | Anzahl an bedingten Leistungspunkten                   |
| Proof Wiederholbarkeit         | Angabe, wie oft ein Nachweis wiederholt werden darf    |
| Studienkollegssemester         | Anzahl der Semester an einem Studienkolleg             |
| Subject ID                     | ID des Studienfaches                                   |
| Subject LP                     | Leistungspunkte eines Studienganges                    |
| Subject Module Group           | Bereiche bzw. Modulgruppen, die ein Studgung umfasst   |
| Subject Name                   | Name des Studienfaches                                 |
| Subject Profil                 | Profil-/Anwendungsfächer im Studiengang                |
| Subject Regelstudienzeit       | ”Normale Semesterzahl zum Abschluss des Studiums”      |
| Subject Wahlpflichtbereich     | Wahlpflichtbereich/Spezialisierung                     |
| Subject Zeitraum Studienbeginn | ”Zeitraum, in dem das Studium begonnen wurde”          |

Table 5.4.: An excerpt of the item collection sheet of POs.

## 6. Version Two

The main focus of the version 2.3 of the [data base reference model \(DRM\)](#) laid on consolidation. In the last version, we designed a model of several entity sets including data items that are acquirable. In this version, we had a secondary priority, that was usability. Hence, we paid attention to two issues:

- Did we really need all items in the data model? Respectively, were there items in the data model with no use to any data analysis of the project, i.e., the *Study Buddy* or the *Buddy Analytics*?
- Did we assigned all items to their entities and all relations between the entities in the way, that the resulting mapping was (a) logically consistent and (b) easy to understand? In other words, was the setting of the entities usable?

Consequently, the design process of version 2.3 had two stages analogous to the two issues. Again, both stages were not executed separately, but overlapping and partly simultaneously.

Concerning the needs of attributes, we consulted the other work groups. We presented the attributes we could deliver according to the data model version 1.1, and the other work groups told us which attributes they would actually use. Some sets were dismissed immediately, like supplements and missing data. Other sets were discussed and evaluated.

- The set ‘supplements’ was identified as future set in the sense, that for example information about students’ lending behaviour of literature is interesting but not urgent for the closure of [student life cycle \(SLC\)](#). For this version, it was important to implement more urgent information that could actually be accessed. The same argumentation hold regarding the entity set ‘missing data’.
- The set ‘course offerings’ alias ‘Semester/Lehrveranstaltungen’ was dismissed. No work group requested this set explicitly and we were afraid going to far in terms of setting up parallel structure to the services of universities’ [campus management system \(CMS\)](#) and violating the teachers’ data protection. In addition to that, we agreed, that the course offerings would rather be in the scope of AP 2 than the scope of AP 4, because their aim is to represent a schedule proposal to the users of Study Buddy, i.e., the students.
- The set ‘examination regulations’ was having a large overlap with the responsibilities of work group 3. So we stopped the work on a data structure for reflecting examination regulations that we started while working on the data model 1.1 and allocated this area totally to work group 3.

- The remaining two sets, ‘personal’ alias ‘Persönliches’ and ‘academic accomplishments’ alias ‘Studienerfolg’, were merged to improve clarity. The new model was going to have areas (personal, enrolment data, and achievement data), but no separated and autonomous entity sets like before.
- The data model should have had a more linear, tree like structure to improve clarity. As negative example, the set ‘academic accomplishments’ of version 1.1 had two loops.
- We dismissed virtual study programs. That were summaries of partial study programs, e.g. double major study programs. We replaced the virtual study programs by the degree as root of a study program (e.g., ‘Kombinatorischer Bachelor of Arts’), and the major and minor study programs as subordinates.

The result of these thoughts can be seen in Figure 6.1. The most obvious characteristic of the model 2.3 is the fact that it now can be described by one ER-diagram instead of five. Another remarkable point is the depiction of the areas personal data, enrolment data, and achievement data.

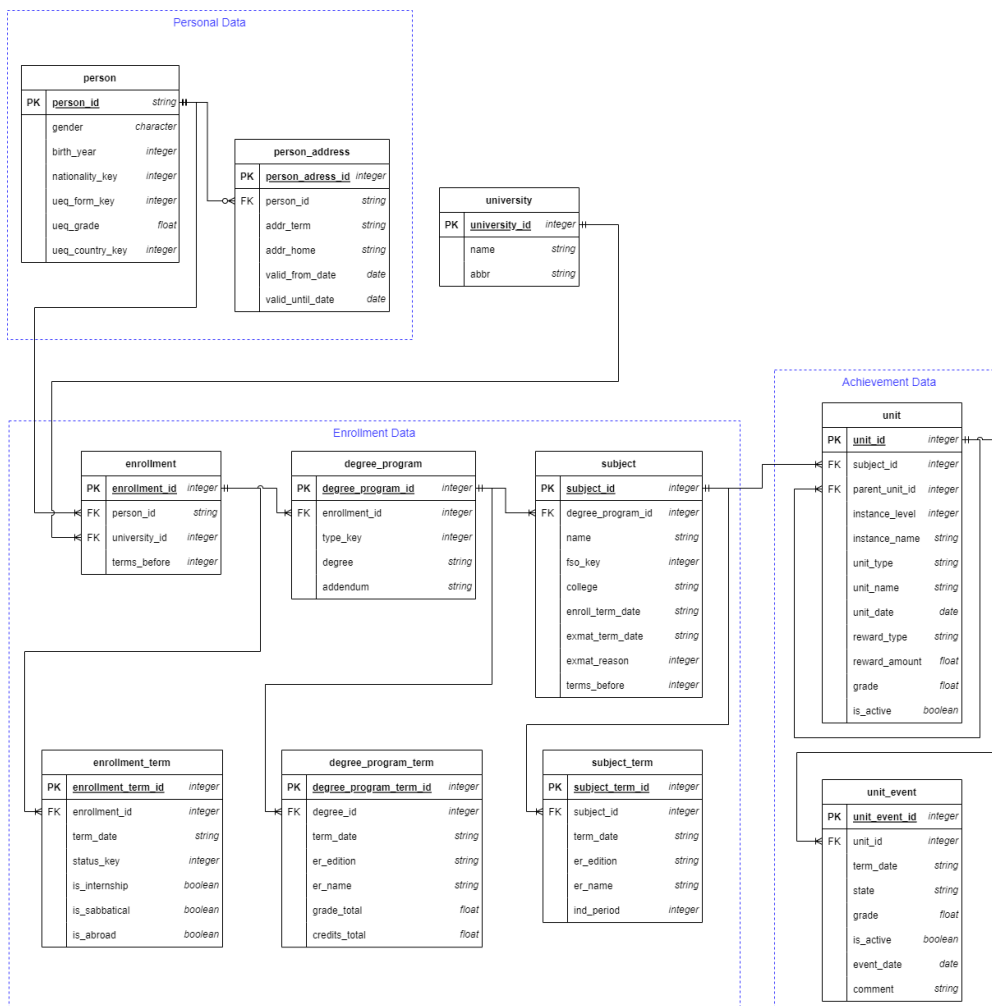


Figure 6.1.: The ER-diagram of the DRM version 2.3.



*By including the ueq into the entity *person*, we dismissed the opportunity, that *person* could also be a lecturer or another non-student.*

### The area ‘personal data’

The area ‘personal data’ comprises the entities *person* and *person\_address*. Herein, student information are stored that are not connected directly to their course of study, e.g., gender, year of birth, nationality, university entrance qualification (ueq), but also such data as home address and address for the term.

### The area ‘enrolment data’

The area ‘enrolment data’ comprises the entities *enrollment* and *enrollment\_term*, *degree\_program* and *degree\_program\_term*, and *subject* and *subject\_term*. As you can see, there are pairs of entities. Every entity that holds attributes of information that do not change over the term has a correspondent entity that holds attributes of information that do change over the term, and this in a 1 : *n* relationship.

The first pair from left to right is the enrolment pair. Overall information are stored in *enrollment*. This entity consists of almost only two attributes: the related person and the related university. For the universities, there is a dedicated entity called *university* containing all information about it, i.e., only its name at this stage of the data model development. Term related information of the enrolment are the information whether a student is actively studying or not and for what reason. Because a student can enrol in different universities, e.g., in university A for the bachelor degree and in university B for the master degree, the relation between *person* and *enrollment* is 1 : *n*.

Before we continue, we want to explain shortly the relation between degree and subject. Concerning a single major study, we produce redundancy, because degree and subject are the same concerning the examination regulations. For example, concerning the examination regulations of the bachelor degree in computer science, the degree in our case would be the bachelor degree in computer science with focus on bachelor degree, and the subject would be bachelor degree in computer science with focus on computer science, but referring to the same version of examination regulations as the degree instance. The more interesting case concerns double major studies. For example, the combinatorial bachelor degree with philosophy and history would result into the degree instance ‘combinatorial bachelor degree’ and two subject instances, ‘philosophy’ and ‘history’. In the end, we would have three different instances referring to three different versions of examination regulations.

The pair in the middle is the degree pair. The term independent part *degree\_program* stores information about the type of degree and the title of the corresponding examination regulations. The term related part *degree\_program\_term* stores information about the version of the examination regulations, the overall grade, and the overall credits gained for this course of study, all by term. It is common that multiple degree programs relate to one enrolment, e.g., a finished bachelor degree program and an ongoing master degree program. Therefore, the relation between these two entities is 1 : *n*.

The last pair in the area ‘enrolment data’ is the subject pair. The term independent part *subject* stores information about the subject and enrolment data. The term related part *subject\_term* stores information about the examination regulations. In the case of a single major study, these information would probably be the same as the information of

*Concerning B.S. Computer Science, degree and subject refer to the same examination regulations.*

degree\_program\_term. In the case of a double major study, these information would differ. The relation between degree\_program and subject is  $1:n$ , because of the possibility of double major studies.

### The area ‘achievement data’

The area ‘achievement data’ is a special case in this data model. As before we have a pair; the term independent part is unit, and the time dependent part is unit\_event. In addition, we have a  $1:n$  relation from unit to itself. A unit in this context can be everything, for example, a major, a field, a subject, a module group, a module, a component, an exam, a presentation, and so on. That is the reason, why unit references itself. We have fields having modules having components, or another hierarchy in this manner. The units are giving the achievement data a structure. The related unit events, on the other hand, assign specific events to the units. There may be no events regarding a unit, or several. For example, if the unit is an exam, unit events would be registration, attendance, and grading. An example of the relation between units and unit events is shown in Figure 6.2. The attributes are named different, because this example was originally used to expound the data reference model 2.1.

*A unit is kind of a wild-card for every scoring object.*

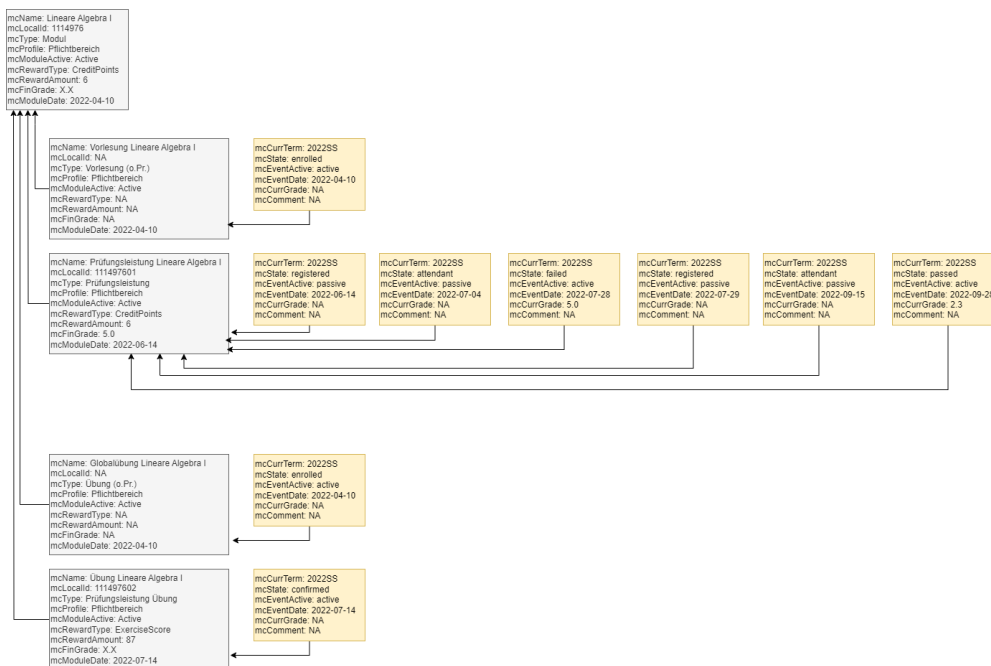


Figure 6.2.: An example of the relation between units (grey coloured) and unit events (orange coloured). The example is based on the data reference model 2.1.

The entity unit contains information about its hierarchic relation to the other units, furthermore information about reward type and amount (so as to store either credit or bonus points), and grade, whereas unit event stores information about term and date of the event, the grade (if applicable), and is\_active, a flag that marks the youngest of all events of a unit.

A more detailed explanation of the data reference model 2.3 can be found in Appendix I, [Data Reference Model 2.3.2](#).

*While the drm 2.3 was never officially released, a paper about its properties was written.*

## 7. Version Three

The [data base reference model \(DRM\)](#) version 0 (see Chapter 4) was a loose collection of ideas about where the DRM could be headed. The DRM version 1 was a collection of all possible data items from the three [campus management systems \(CMSs\)](#) (each of one location). The DRM version 2 was a reduced collection, serving the needs of the other [work packages \(APs\)](#). The DRM version 3 was the merge of the DRM and the data models of AP 2 and 3.

As mentioned in Subsection 5.2.3, the course catalogue was not part of the scope of AP 4, but of AP 2. That means, it was excluded from the DRMs version 1 and 2. At this point, where we want to integrate all three data models of AP 2, 3, and 4 into the DRM, the data model of AP 2 with its course offerings would be part of the DRM, again. It behaves similar with the data model of AP 3. The examination regulations, excluded from DRMs version 1 and 2, were part of the scope of AP 3 (see also Section 5.4). For DRM version 3, the data model of AP 3, i.e., the examination regulations, would be part of the DRM. In the end, the two areas course catalogue and examination regulations would be integrated into the DRM to build version 3.

In the first step, we loosely defined which data this included. In the case of the course catalogue, this was quite easy: data of course offerings including recurring day, time and room as well as exam dates. Concerning the examination regulations data, it was harder to define a list of candidates for entities and attributes, because examination regulations data is far more complex than course catalogue data.

Figure 7.1 shows the first attempt to convert the information of examination regulations stored in JSON like form into entities and attributes to be included in the DRM. We will not explain Figure 7.1 further, nor the entities or groups shown in this figure. We just wanted to let the reader gain a first impression of the complexity of the task.

*The entities that result from this graphic are, of course, explained further.*

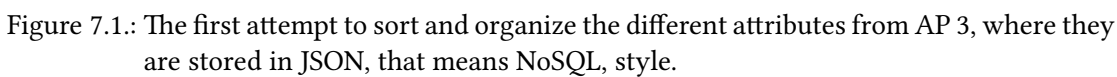
Designing a new version of a data model, we had to ask us two important questions:

- Do we want to keep the structure of our data model or do we want to restructure the whole model?
- Do we want to integrate the new data as close as possible to their original model, i.e., the data model of AP 3, or do we want to adapt the representation of the new data to our model?

In the beginning, we did not unite on these questions. As a result, we did not come up with one new model proposal, but three. The three differed in the form as follows:

- One proposal restructured the whole model, and integrated the new data as close as possible to their original model.

restricted to interests of AP3



- One proposal kept the old structure, and integrated the new data as close as possible to their original model.
- One proposal kept the old structure, and adapted the representation of the new data to our model.

## 7.1. The galaxy model

As already mentioned, one proposal was a restructured model in which the new data were integrated as far as possible according to their original model. Thereby, three different areas were identified: head-related information, time-related information, and information related to the examination regulations. Two link tables form with two each areas a star-like link schema, and these area pairs are head-related information together with time-related information, and time-related information together with examination regulations-related information, combined to a galaxy-like link schema. You can see this model in Figure 7.2.

The main idea of this model was, that the upper link table would have represented the data model 2.3, while the downer model would have represented the fusion between data model 2.3 and the model of the examination regulations of AP 3.

The term-independent entities of data model 2.3 were called the ‘heads’, because of the 1:n relation to the term-dependent entities. For example, the general enrolment information are the head of the multiple term-related enrolment information. These entities like the term-independent entities were grouped together as the head-related area. On the other hand, the term-dependent entities were grouped together as the time-related area. We have to admit that these areas only exist to sort the [ER-diagram](#). There is no technical realization of them. Nevertheless, the two upper areas form together with the link table the data model 2.3. The last model was struct hierarchical, that means, you had to pass from entity to entity to reach your desired information. Due to the link table, it was possible to reach any information of the [student life cycle \(SLC\)](#) at once. This also meant that some entities, which only existed to maintain the hierarchy, could be omitted. However, it is more difficult to comprehend such models cognitively than the hierarchical ones.

In Figure 7.2, the second central entity, `exreg_element`, is not a link table, as this was a first draft. This was not intended for the final model. Nevertheless, this entity links the time-dependent area with the area for examination regulations. Degree programs and study subjects are having examination regulations, in fact each for every subject and an additional one for the degree program, that makes three or four for double major studies or just one for single major studies (that would appear twice, for the degree and for the subject). Courses and achievements have their equivalent in examination regulations and module compendia. Because of this duality, it made sense to a) include the examination regulations into the model, and b) link the equivalent entities with each other. Regarding the entities, we have worked with AP 3 to adopt their storage logic of the examination regulations to reduce errors in the transmission of the relevant data. In the final model, however, we opted for a different, easier-to-understand system for storing the validation rules. That is the reason, why we do not go deeper into this data model but conclude the explanations here.

*This description is very loosely due to the fact that the model has never been used.*

*Figure 7.2 is a conceptual graphic that does not yet represent the final model and therefore has deficiencies.*

Figure 7.2.: The proposal for a galaxy data model.

## 7.2. The preserver model

The second proposal kept the old structure, and integrated the new data as close as possible to their original model. As you can see in Figure 7.3, this proposal preserved the data model 2.3 in the upper half. Not only the ER-diagram could be preserved, but the data dictionary as well. Only some attributes were added to link the upper to the downer half. As already described above, degree program and study subject were linked to their examination regulations. The most significant change was the elimination of the self-referencing of the unit entity. Self-referencing was a tool to represent the hierarchies of the examination regulations in the achievements. Now that the achievements of the students could be linked directly to the relevant examination regulations, this form of representation was no longer needed.

*The preserver model is the oldest of the three, so the representation of the examination regulations was the most simplistic.*

The logic of the examination regulations was quite simple. The ‘head node’ of a set of examination regulations was represented by `examination_regulation`, linked to degree program and subject component. This `examination_regulation` had only one kind of relation, i.e., the relation to `er_mod_comp_nod`. In principle, every element (component, module, field or profession, etc.) of examination regulations could be an `er_mod_comp_nod`. To map adequately the examination regulations, `er_mod_comp_nod` could be specialized by further three entities: `er_study_node`, `er_module`, and `er_component`. Because modules and components can be represented by units as achievements of a student, `er_mod_comp_nod` was linked to `unit` additionally.

We get an hierarchy on the entities, because, for example, components depend on modules depend on fields or professions. Actually, this would mean a self-referencing of the entity `er_mod_comp_nod`, but to avoid this self-referencing, the specialized entities refer to hierarchical higher instances of `er_mod_comp_nod`.

This model is unsatisfactory, because the rules of a set of examination regulations were not modelled, e.g., the rule, that module B can only be approached, if module A is completed. But neither of the three presented models could reflect rules of examination regulations.

*AP 3 had a database of its own to reflect rules in the examination regulations.*

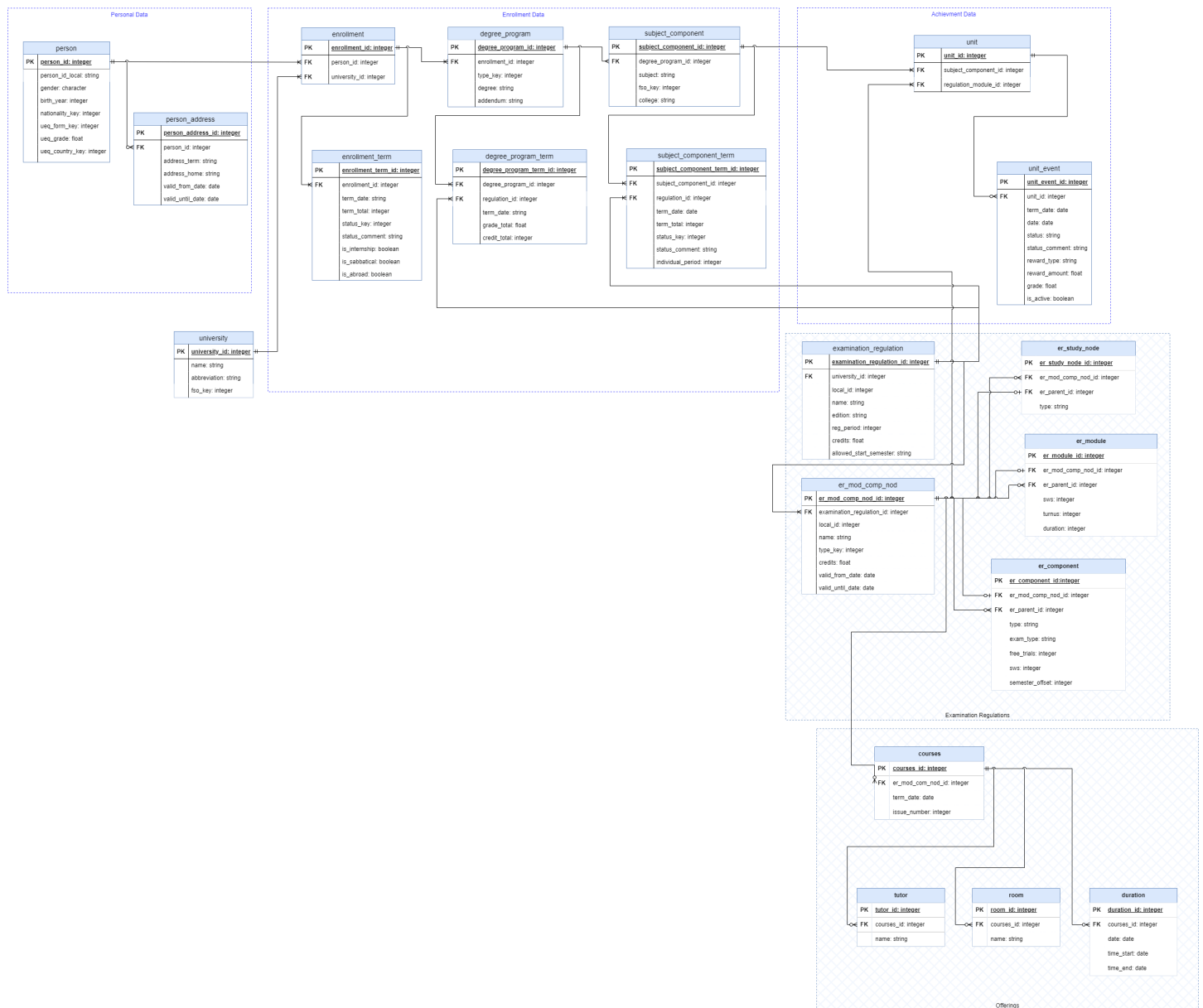


Figure 7.3.: The proposal for the preserver model.



### 7.3. The final model

The third proposal and the final candidate for our DRM kept the old structure, and adapted the representation of the new data to our model. As you can see in Figure 7.5, the model can be divided into two halves with the downer half designed from the data model version 2.3 (see Chapter 6). The upper half is designed to mirror the examination regulations of study courses. The two halves are marked in Figure 7.6. We do neither explain similarities between data model 2.3 and the lower part of the data model, nor minor changes from model 2.3 to the new one. Instead, we refer you to the data model version 2.3, that is very similar. However, there are three major changes.

*Modules and components got separated.*

*All three models dissolve the recursion of `unit`.*

First, `units` no longer represent modules and components of the examination regulations, but only modules. Consequently, `unit_events` no longer represent specific events (exam registration, exam participation, announcement of results), but components of the modules. Information about events got excluded.

Second, there is no self-referencing as in model 2.3. Instead, the dependencies between modules and components are represented by the upper half and the examination regulations. More on this later.

And third, course data (called offerings) have been added, which are divided into three categories: `course_offering` for courses such as lectures, seminars, etc.; `exam_offering`, that shows examination dates; and `assessment_offering` for assessment achievements without a specific date, such as seminar papers. On the one hand, the offerings are linked to the `unit_events`, i.e., achievement data of module components such as lectures, seminars, etc. This means that a specific service date is added to each achievement of a student, assuming the relevant offering exists in the data of local CMSs. At the same time, the corresponding offerings are also assigned to components represented by the examination regulations (components in the upper half), that means, not from local CMSs, but extracted from the examination regulations.

*Examination regulations have been provided as standardized JSON files.*

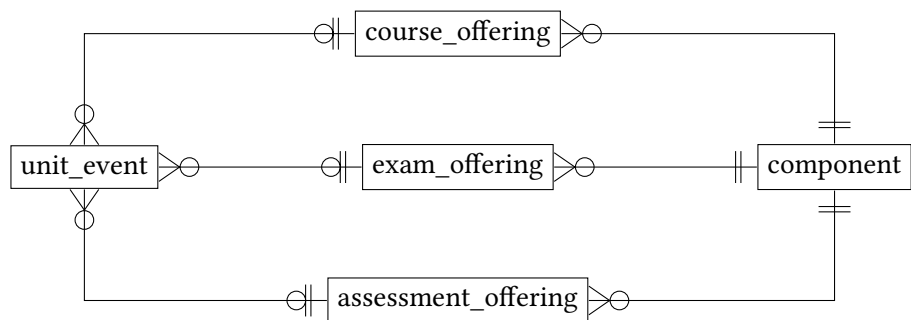


Figure 7.4.: Relation between the different aspects of a course as ER-diagram.

We observe that a `unit_event` has exactly one or none components they belong to. `unit_event` can be related up to three offerings (`assessment_offering`, `course_offering`, and `exam_offering`), but all three offerings would point to one and the same `component`. There exists more relations between upper and downer half, but the focus will now lay on the upper half, i.e., the part storing information about examination regulations.

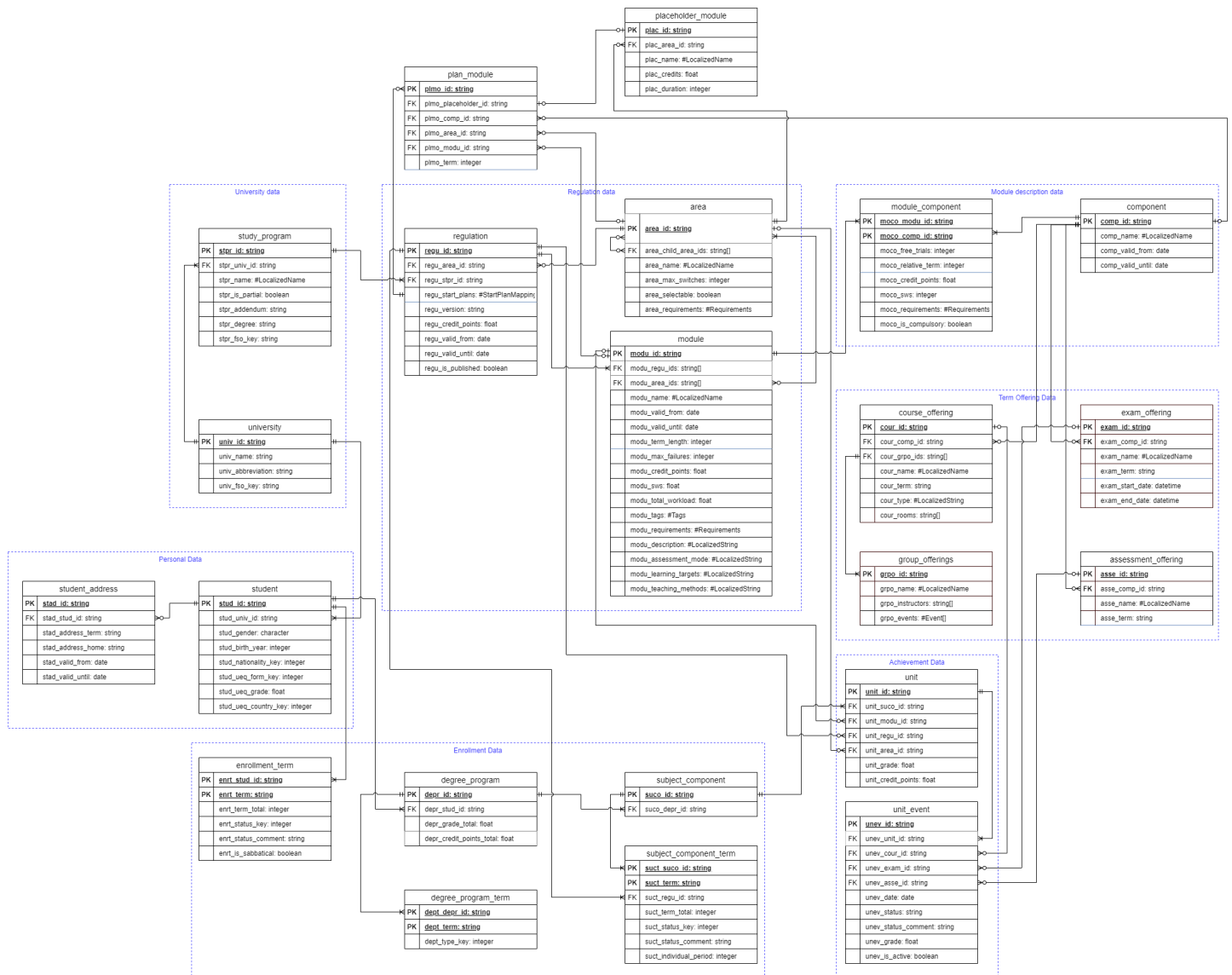


Figure 7.5.: The proposal for the final model.

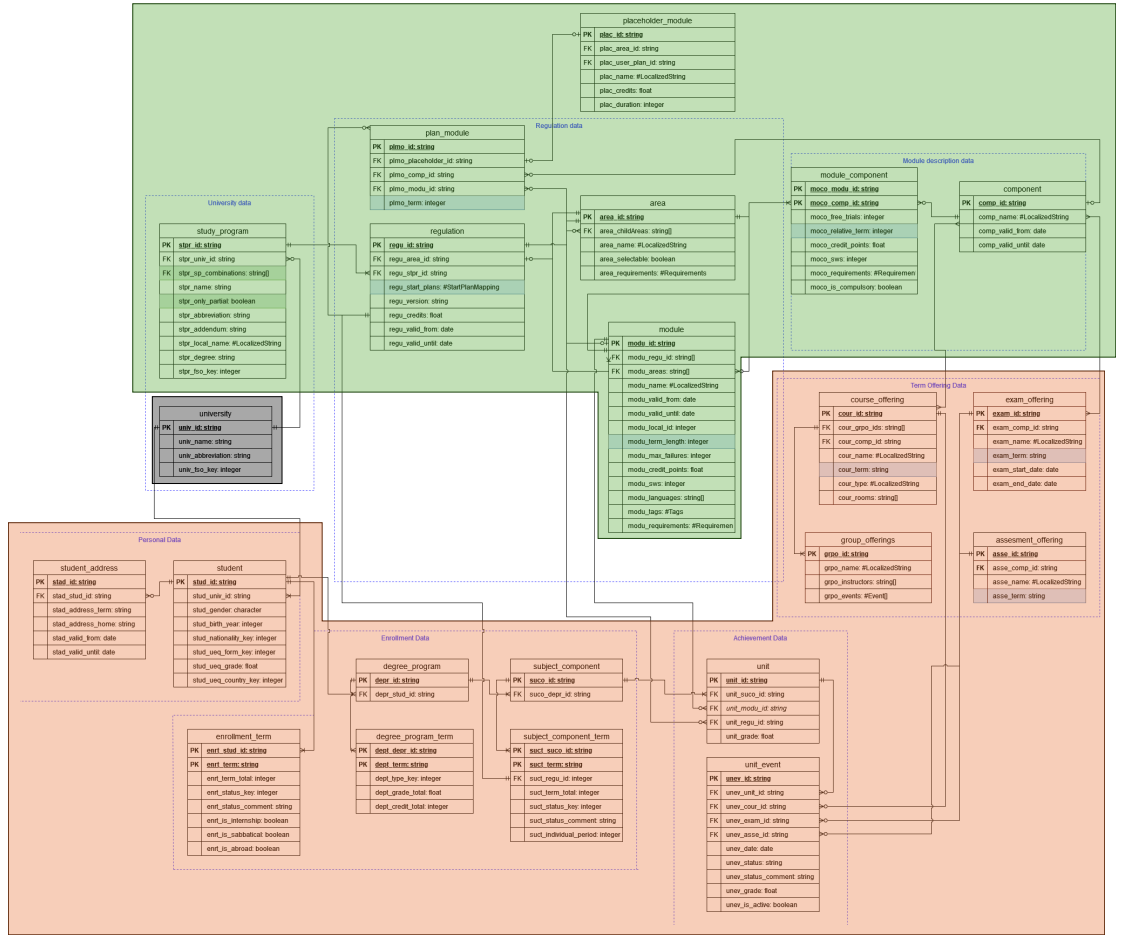


Figure 7.6.: The upper and the downer halves of the final data model. Green marks entities filled by the descriptions of examination regulations, orange marks entities filled by the CMS of a university. The black marked part contains additional information filled in by hand.

Before we explain the upper half of the DRM, we have to clarify an important point concerning the ER-diagrams in Figure 7.5 and Figure 7.6. Usually, ER-diagrams implicate an [Structured Query Language \(SQL\)](#) like data structure for two reasons. First, ER-diagrams consists of entities, their attributes and relations between entities. This corresponds one-to-one with the tables of an SQL data structure, their columns, and primary and foreign keys for the relations. So, ER-diagrams describe SQL data structures and vice versa. Second, usually you only consider four data types for the attributes of an ER-diagram respectively columns of SQL structured tables that are text, number, date times, and binary. On the other hand, [NoSQL](#) structured data bases are not necessarily structured in columns, but can have quiet a dynamic structure. Such data bases could never be represented by an ER-diagram. Additionally, NoSQL data bases can have specially defined and complex data types, among others. These data types could also not be represented as attributes in an ER-diagram. The DRM 3.6 has a hybrid data structure. The downer half of the DRM is SQL based like the DRM version 2.3. The upper part however is NoSQL based what can be observed by complex data types like `#LocalizedString`,

#StartPlanMapping, #Requirements, and so on. A definition of these data types can be found in Appendix J. We chose this model for two reasons. The examination regulations are stored in JSON files by AP 3. It is easier to move this information from JSON file into a NoSQL based data base then to an SQL based data base. And, even if the complex data types could have been replaced by additional entities, we have at least one data type that is dynamically generated at run-time.

## 7.4. Examination regulations in the data model

AP 3 processes the examination regulations of all courses of studies and saves them in JSON files. Then, this information is used to fill the data model, to be more precise, that part of the data model that is not filled by the CMS. The examination regulations are mapped as follows: a study program bundles one to many examination regulations (as mentioned in Chapter 6). Examination regulations are represented by `regulation`, that is split up into areas. An area can itself be split into one or more areas. However, a modules can be assigned to an area and at the same time to a `regulation`. Last but not least, `module_component` (the link between module and component) and component build up the components of the [module compendium](#). Let us have a more detailed look.

`course_offerings` and `exam_offerings` are related to components. Of course, several course offerings can be related to the same component, e.g. Mathematics A in summer term 2021 and Mathematics A in winter term 2021/22 would be related to the component Mathematics A. The component entity is just a stopover storing almost only the name of the component. The real specification of a component is stored in `module_component`. A component can be related to several `module_component`, like Mathematics A can be related to Mathematics A/engineer's regulations and Mathematics A/teacher's regulations. So, one component can refer to one to many examination regulations, i.e., `module_component`.

The `module_component` stores free trials, credit points, work per term week, and so on. It is related to `module`, because you have to pass one to many components, to achieve a module. The module stores all information about a module, like maximal number of failures, credit points (often but not always the sum of the credit points of its components), work per term week, total workload, and so on. Modules are on their part related to area and regulation, giving them the opportunity to bypass area. It follows that areas are optional, e.g., basic modules could be related directly to the regulations, while context-dependent modules would be assigned to one or more areas.

The area groups modules and therefore can have areas on their part. Besides the structuring of the modules, the most important information areas are storing are #Requirements, that are also stored and applied in `module` and `module_component`. Requirements or rules of the examination regulations can be anything, but an requirement that must be fulfilled before 'accessing' a component, module or area, or a rule that must be applied to achieve a component, module or area. It would go too much into detail to explain requirements, beside requirements are supplied by the converted examination regulations of AP 3, so we would refer at this point to their documentation. To illustrate what is meant by requirements respectively rules we will give some example. If areas model the profiles in examination regulations, the one requirement

of an area could be the constraint that another area could not be chosen at the same time. The requirement of advanced chemistry II could be an achievement in advanced chemistry I. And in the end, some assignments (that are components) require achievements in some other components before they could be approached. So, we do not only store the relations of components, modules, and areas by relations based on the typical primary/foreign key concept, but we also store the requirements of each component, module, and area to start or finish them, and therefore the whole examination registrations with all their rules.

Last but not least, we have the entity `regulation`, which represents the examination regulations. It summarizes all of the modules and areas as on set of examination regulations. It is named like “examination regulations to achieve the bachelor degree in computer science from March the 3rd 2021”, what would be the official name. Because some study programs, e.g., the double major programs, need more than one set of examination regulations, several instances of `regulation` can be summarized by `study program`.

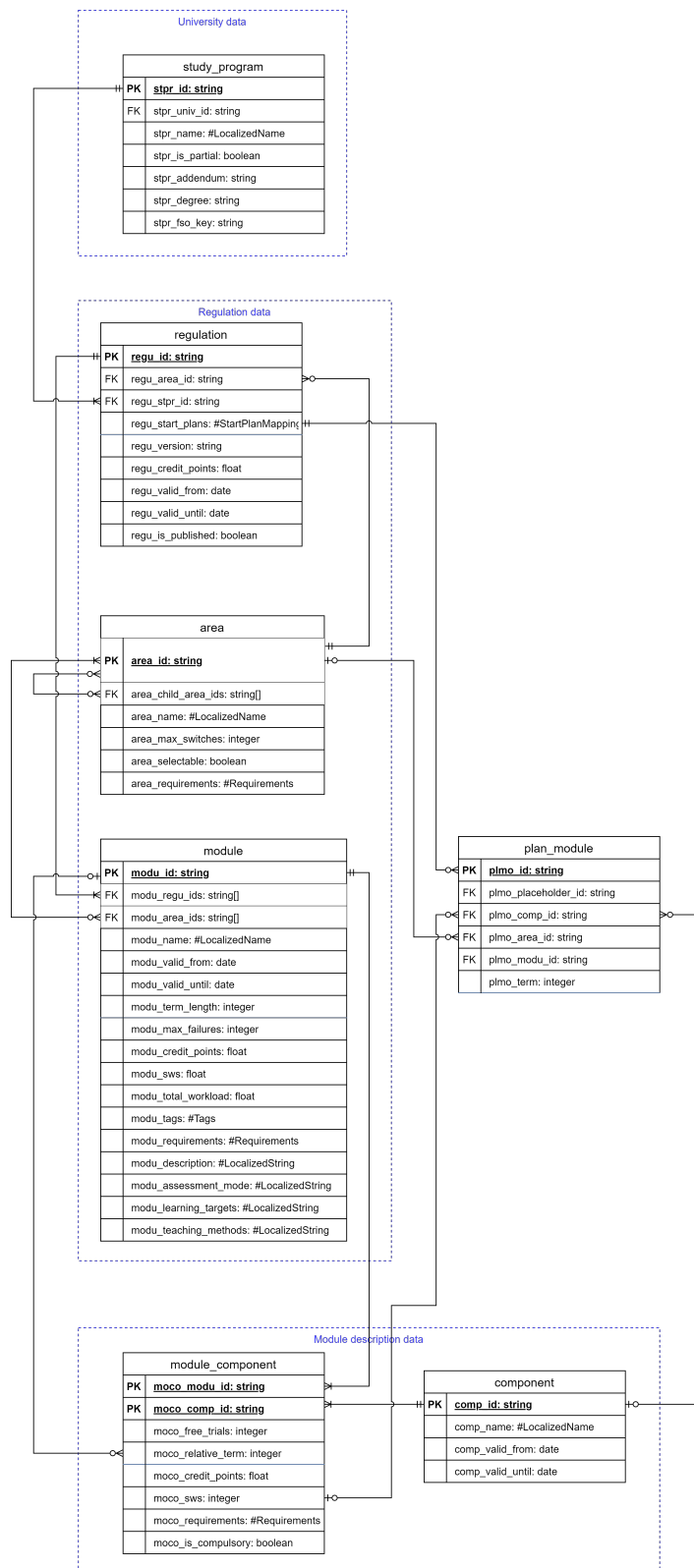


Figure 7.7.: Partial view from the upper part of the DRM 3.6.

## 8. Version Four

### Future data reference models

Finally, we take a look at the development of the [data base reference model \(DRM\)](#) after the end of the project, i.e. a purely hypothetical consideration at this point. There are a large number of other data sources that have not yet been taken into account. There is the student library data from the ALMA system, which is used at all three locations. There is also [learning analytics \(LA\)](#) data from the [Moodle](#) learning management system. These two were already considered in Chapter 5. There are student surveys that are used at all three locations (e.g. KOAB, CHE). Alumni data could be used after obtaining their consent. In this way, a) a much more detailed peer group could be created, with which the student is compared and on which recommendations are based, and b) the information on offer could be expanded, through book or learning recommendations. But first, a review of model 3.6 with extensive field testing would provide further insight into the practicality of the data reference model.

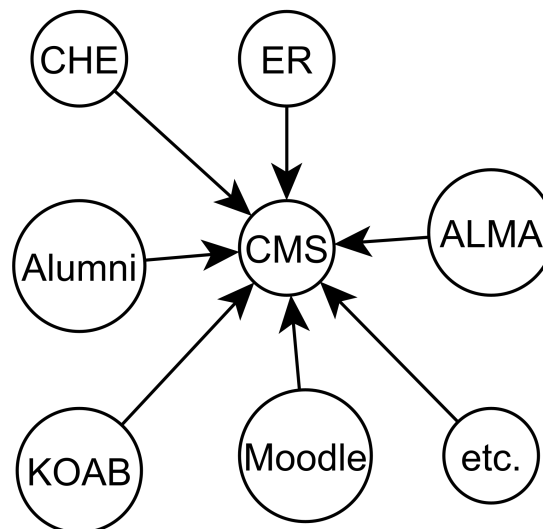


Figure 8.1.: A schematic illustration of the CMS and other sources linked to it.





## 9. Bibliography

- Bachman, Charles W. "Data structure diagrams". In: *ACM SIGMIS Database: The DATABASE for Advances in Information Systems* 1.2 (1969), pp. 4–10 (cit. on p. 11).
- Beck, Kent. *Extreme programming explained: embrace change*. addison-wesley professional, 2000 (cit. on p. 16).
- Berens, Johannes et al. "Early Detection of Students at Risk - Predicting Student Dropouts Using Administrative Student Data from German Universities and Machine Learning Methods". en. In: *Journal of Educational Data Mining* 11.3 (2019), pp. 1–41. DOI: [10.5281/ZENODO.3594771](https://doi.org/10.5281/ZENODO.3594771) (cit. on p. 22).
- Boehm, Barry W. "A spiral model of software development and enhancement". In: *Computer* 21.5 (1988), pp. 61–72 (cit. on p. 16).
- Feiler, Lukas and Nikolaus Forgó. *EU-DSGVO: EU-Datenschutz-Grundverordnung*. Erste Auflage. Verlag Österreich, Dec. 2016 (cit. on p. 14).
- Florian Berthold, Pouya Soudmand. *Learning Analytics New Data Model*. PADS internal Presentation. Apr. 2022 (cit. on p. 30).
- Gidey, Ephrem et al. "The plan-do-check-act cycle of value addition". In: *Industrial Engineering & Management* 3.124 (2014), pp. 2169–0316 (cit. on p. 15).
- Judel, Sven and Ulrik Schroeder. "EXCALIBUR LA - An Extendable and Scalable Infrastructure Build for Learning Analytics". In: *2022 International Conference on Advanced Learning Technologies (ICALT)*. IEEE, July 2022. DOI: [10.1109/icalt55010.2022.00053](https://doi.org/10.1109/icalt55010.2022.00053) (cit. on p. 23).
- Lemahieu, Wilfried, Seppe vanden Broucke, and Bart Baesens. *Principles of Database Management: The Practical Guide to Storing, Managing and Analyzing Big and Small Data*. Cambridge University Press, 2018. DOI: [10.1017/9781316888773](https://doi.org/10.1017/9781316888773) (cit. on p. 31).
- Li, Xu, Qi Shen, and Tiancheng Yang. "Design and optimization of multidimensional data models for enhanced OLAP query performance and data analysis". In: *Applied and Computational Engineering* 69 (2024), pp. 161–166 (cit. on p. 11).
- Moody, Daniel L and Mark AR Kortink. "From enterprise models to dimensional models: a methodology for data warehouse and data mart design." In: *DMDW*. 2000, p. 5 (cit. on p. 11).
- OMB, (Office of Management and Budget). *The common approach to federal enterprise architecture*. Office of Management and Budget. USA, 2012 (cit. on p. 3).
- Persike, Dr. M. (ed.) *Verbundvorhabensbeschreibung AIStudyBuddy*. unpublished. July 2021 (cit. on pp. 3, 17 sq., 30, 74, 337).
- Pouya Soudmand, Florian Berthold. *Learning Analytics und Educational Data Mining an der RWTH Aachen University*. internal. May 2022. URL: <https://www.rwth-aachen.de/cms/root/studium/Lehre/Digitalisierungsstrategie-der-Lehre/Networking/Talk-Lehre/%20lmtfk/Talk-Lehre/> (cit. on p. 24).
- Ralph Kimball, Margy Ross. *The Data Warehouse Toolkit*. Wiley John + Sons, July 2013. ISBN: 1118530802. URL: [https://www.ebook.de/de/product/20197316/ralph\\_kimball\\_margy\\_ross\\_the\\_data\\_warehouse\\_toolkit.html](https://www.ebook.de/de/product/20197316/ralph_kimball_margy_ross_the_data_warehouse_toolkit.html) (cit. on p. 14).
- S. Sumathi, S. Esakkirajan. *Fundamentals of Relational Database Management Systems*. Springer Berlin Heidelberg, Feb. 2007. 808 pp. ISBN: 3540483977. URL: [https://www.ebook.de/de/product/5951351/s\\_sumathi\\_s\\_esakkirajan\\_fundamentals\\_of\\_relational\\_database\\_management\\_systems.html](https://www.ebook.de/de/product/5951351/s_sumathi_s_esakkirajan_fundamentals_of_relational_database_management_systems.html) (cit. on p. 24).
- Saxena, Geetika and Bharat Bhushan Agarwal. "Data Warehouse Designing: Dimensional Modelling and ER Modelling". In: *International Journal of Engineering Inventions* 3.9 (2014), pp. 28–34 (cit. on p. 11).

- Simsion, Graeme C. and Graham C. Witt. *Data modeling essentials*. eng. 3rd ed. Graeme C. Simsion and Graham C. Witt., Includes bibliographical references and index. Boston, 2005. ISBN: 0126445516 (acid-free paper). URL: <http://www.loc.gov/catdir/description/els051/2004275106.html> (cit. on p. 6).
- Sokovic, Mirko, Dusko Pavletic, and K Kern Pipan. "Quality improvement methodologies – PDCA cycle, RADAR matrix, DMAIC and DFSS". In: *Journal of achievements in materials and manufacturing engineering* 43.1 (2010), pp. 476–483 (cit. on p. 15).
- Song, Il-Yeol, Mary Evans, and Eun K Park. "A comparative analysis of entity-relationship diagrams". In: *Journal of Computer and Software Engineering* 3.4 (1995), pp. 427–459 (cit. on p. 11).
- Thalheim, Bernhard. *Entity-Relationship Modeling*. Springer Berlin Heidelberg, 2000. DOI: [10.1007/978-3-662-04058-4](https://doi.org/10.1007/978-3-662-04058-4) (cit. on pp. 6, 335).
- Tupper, Charles. *Data architecture*. eng. Charles Tupper., Includes bibliographical references and index. Burlington, MA, 2011. ISBN: 9780123851260 (pbk.) (Cit. on p. 14).
- West, Matthew. *Developing high quality data models*. eng. Matthew West., Includes index. Burlington, MA, 2011 (cit. on p. 24).

## 10. Appendix

### A. List of participants

Official abbreviations and names are in German; English translations follow in parentheses.

University of Aachen

- *CLS* – Center für Lehr- und Lernservices (*Center for Teaching and Learning Services*)
- *KBS* – Lehr- und Forschungsgebiet Informatik 5: Wissensbasierte Systeme (*Knowledge-Based Systems Group*)
- *LT* – Lehr- und Forschungsgebiet Informatik 9: Lerntechnologien (*The Learning Technologies Research Group*)
- *PADS* – Lehrstuhl für Process and Data Science (*Chair of Process and Data Science*)

University of Bochum

- *EDMT* – Lehrstuhl für Ethik der digitalen Methoden und Techniken (*Chair for Ethics of Digital Methods and Technologies*)
- *ZfW* – Zentrum für Wissenschaftsdidaktik (*Centre for Teaching and Learning*)
- *EDS* – Arbeitsbereich Educational Data Science (*Professional Field of Educational Data Science*)

University of Wuppertal

- *QSL* – Universitätsservice für Qualität in Studium und Lehre (*University Service for Quality in Studies and Teaching*)
- *WIB* – Wuppertaler Institut für bildungsökonomische Forschung (*Institute for Research in Economics of Education at the University of Wuppertal*)

## B. Work package 4

The following two pages are the description of work package (AP) 4 (Persike, 2021).

|         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |          |             |      |     |     |      |     |     |      |        |  |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------|------|-----|-----|------|-----|-----|------|--------|--|
| AP4     | Datensammlung / Datenfreigabe zur Etablierung des Referenzmodells                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Laufzeit | 11/21-10/24 |      |     |     |      |     |     |      |        |  |
|         | Technisch verfügbare Daten werden erfasst, rechtliche Zugriffsmöglichkeiten ermittelt und abgesichert und die Relevanz für angestrebte Analysen bestimmt. Auf dieser Basis werden das Referenzmodell zum KI-basierten Studienmonitoring entwickelt, eine NRW-Clearingstelle für die hochschulübergreifende Zusammenführung der Daten sondiert und die Technikfolgen abgeschätzt.                                                                                                                                                                                                                                                                  | Lead     | QSL & EDMT  |      |     |     |      |     |     |      |        |  |
|         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | CLS      | LT          | PADS | KBS | WIB | QSL  | ZfW | EDS | EDMT | Gesamt |  |
|         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 6        | -           | 6    | -   | -   | 34,2 | 30  | -   | 7    | 83,2   |  |
| UAP 4.1 | Erfassung der projektrelevanten, verfügbaren Daten und Identifikation personenbezogener Daten                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Lead     | QSL & ZfW   |      |     |     |      |     |     |      |        |  |
|         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -        | -           | 2    | -   | -   | 3    | 3   | -   | 1    | 9      |  |
|         | An jedem Kooperationsstandort werden alle zugänglichen Datenquellen erfasst, die studienverlaufs-bezogenen Informationen enthalten. Es wird ein detaillierter Katalog angelegt, der verantwortliche Stellen, Ansprechpartner, verwendete Datenmodelle und vorhandene Schnittstellen auflistet. Die vorhandenen Daten werden hinsichtlich ihrer Projektrelevanz bewertet und personenbezogenen Daten werden identifiziert.                                                                                                                                                                                                                         |          |             |      |     |     |      |     |     |      |        |  |
| UAP 4.2 | Ermittlung der rechtlichen Zugriffsmöglichkeiten im Rahmen des Forschungsprojekts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Lead     | QSL         |      |     |     |      |     |     |      |        |  |
|         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -        | -           | -    | -   | -   | 6    | 6   | -   | -    | 12     |  |
|         | Mit den verantwortlichen Stellen wird geklärt unter welchen Bedingungen auf die projektrelevanten Daten zugegriffen werden kann. Dabei wird zwischen einem ersten Zugriff im Rahmen des Forschungsprojekts und einem späteren Zugriff im Regelbetrieb unterschieden. Hindernisse werden erfasst und mögliche Maßnahmen zur Ermöglichung des Datenzugriffs ausgearbeitet.                                                                                                                                                                                                                                                                          |          |             |      |     |     |      |     |     |      |        |  |
| UAP 4.3 | Ermittlung der rechtlichen Zugriffsmöglichkeiten für einen Regelbetrieb                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Lead     | QSL         |      |     |     |      |     |     |      |        |  |
|         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -        | -           | -    | -   | -   | 6    | 6   | -   | -    | 12     |  |
|         | Auf Basis des implementierten Forschungszugriffs werden mit den verantwortlichen Stellen Maßnahmen entwickelt, die einen Zugriff auf die projektbezogenen Daten auch während eines Regelbetriebs erlauben. Dabei werden die Verzeichnisse der Verarbeitungstätigkeiten der relevanten Datenquellen zugrunde gelegt.                                                                                                                                                                                                                                                                                                                               |          |             |      |     |     |      |     |     |      |        |  |
| UAP 4.4 | Konstruktive, ethische Folgenbewertung zum Überwachungs- und Kontrollpotential                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Lead     | EDMT        |      |     |     |      |     |     |      |        |  |
|         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -        | -           | -    | -   | -   | -    | -   | -   | 5    | 5      |  |
|         | Über Ansätze einer konstruktiven, ethischen Technikfolgenabschätzung soll zum einen das erhebliche Überwachungs- und Kontrollpotenzial der Datennutzung durch den StudyBuddy kritisch reflektiert werden. Hierzu gehören insb. auch bereits bestehende und potentiell neu entstehende Informations-Asymmetrien zwischen Studierenden, Studienberater:innen, Studiengangsdesignern und Universität. Zum anderen werden Möglichkeiten zur Minimierung entsprechender Risiken erarbeitet und Potentiale für eine vertrauenswürdige Umsetzung identifiziert werden. Dies soll als Input für die Gestaltung des Referenzmodells bereitgestellt werden. |          |             |      |     |     |      |     |     |      |        |  |
| UAP 4.5 | Entwicklung des Referenzmodells                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Lead     | QSL & PADS  |      |     |     |      |     |     |      |        |  |
|         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -        | -           | 4    | -   | -   | 3    | 3   | -   | 1    | 11     |  |
|         | Zur Zusammenführung der Daten verschiedener Hochschulen und deren Systeme wird ein einheitliches Datenmodell definiert und ein Datawarehouse konzeptioniert, das die Daten aufnehmen, verwalten und für die weitere Verarbeitung bereitstellen kann.                                                                                                                                                                                                                                                                                                                                                                                              |          |             |      |     |     |      |     |     |      |        |  |

|                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                |      |   |   |   |   |      |   |   |   |      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---|---|---|---|------|---|---|---|------|
| UAP<br>4.6                                                                                                                                                                                                                                                                                                                                                                                                                | Konzeption eines Datenschutzkonzepts                                                                                                                                                                                                                                                                                                                           | Lead |   |   |   |   | ZfW  |   |   |   |      |
|                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                | 1    | - | - | - | - | 3    | 3 | - | - | 7    |
| Um die Kontrolle über die eigenen Daten durch die Nutzer im Regelbetrieb zu gewährleisten, wird ein Datenschutzkonzept erarbeitet, welches die Einwilligungen der Nutzer einholt und nach gesetzlichen Vorgaben auf Änderungen reagiert. Es wird ein Verfahren konzipiert, wie die Daten der Nutzer pseudonymisiert verarbeitet werden können, derart, dass ein späteres Löschen nutzerbezogener Daten möglich sein wird. |                                                                                                                                                                                                                                                                                                                                                                |      |   |   |   |   |      |   |   |   |      |
| UAP<br>4.7                                                                                                                                                                                                                                                                                                                                                                                                                | Administrative Umsetzung des Referenzmodells                                                                                                                                                                                                                                                                                                                   | Lead |   |   |   |   | QSL  |   |   |   |      |
|                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                | 2    | - | - | - | - | 10,2 | 6 | - | - | 18,2 |
| Formulierung und Implementierung administrativer Prozesse der Datensammlung zur Umsetzung des Referenzmodells. Fehlende Schnittstellen zu den projektrelevanten Datenquellen werden implementiert, um den Datentransfer in das Datawarehouse zu ermöglichen.                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                |      |   |   |   |   |      |   |   |   |      |
| UAP<br>4.8                                                                                                                                                                                                                                                                                                                                                                                                                | NRW-Clearingstelle                                                                                                                                                                                                                                                                                                                                             | Lead |   |   |   |   | CLS  |   |   |   |      |
|                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                | 3    | - | - | - | - | 3    | 3 | - | - | 9    |
| Konzeption und Sondierung einer NRW-Clearingstelle für die hochschulübergreifende Zusammenführung von Studiendaten.                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                |      |   |   |   |   |      |   |   |   |      |
| Meilensteine                                                                                                                                                                                                                                                                                                                                                                                                              | Katalog projektrelevanter Daten(quellen) (M8); Zugriffserlaubnisse aller verantwortlichen Stellen für Forschungsprojekt (M14); Zugriffserlaubnisse aller verantwortlichen Stellen für Regelbetrieb (M36); Ethischer Bericht zum Überwachungs- und Kontrollpotential (M24) sowie zu Möglichkeiten der Minimierung von Risiken und Nutzung von Potentialen (M36) |      |   |   |   |   |      |   |   |   |      |

## C. Connection between data base management system and data base model

This short essay about [data base management system \(DBMS\)](#) and [Data base model \(DBM\)](#) was originally written to be displayed in *GitLab*<sup>1</sup> Particularly the graphs are coded in *Mermaid*<sup>2</sup> and will not be rendered in this document. Please excuse any inconvenience.

In this text we want to explain briefly the difference between the different database management systems and their influence on database models. We claim neither completeness on this topic nor scientific precision. The text is more like "a talk about databases".

### Main database management models

#### Relational databases

Relational databases are sorted into tables. Every table consists of a key unique to each row and several more columns, which consists of strings, numbers or categorial variables. As soon as redundancy/duplicates appear, tables should be split and linked, and can reunited by *joins*.

Advantages:

- Many analyses algorithms are very fast on tables.
- Data can easily be used to generate new key-value-databases.
- *Join* is a very fast operation generating on-demand data sets.

Disadvantages:

- The objects in the database model have all to consist of strings, numbers or categorial variables. It is not possible to include lists or sub-objects in an object, neither it is possible to use "mixed-type" variables (unions).
- The database model should not contain loops. Otherwise the *Join* operation would not be unique.

A---B;

A---C;

B---D;

C---D;

*In this example containing a loop, the Join A->B->D would be possible as would be A->C->D; also the Join A->B would be possible as would be A->C->D->B.*

Loop containing models can be linearised by cutting edges, inserting inter-tables or using not one universal data model but several models. The technique of transforming databases into normal form has to be mention here, pursuing exactly the goal of creating uniquely defined joins.

<sup>1</sup>GitLab EE at <https://git.rwth-aachen.de>.

<sup>2</sup><https://mermaid.js.org/>

### Object-orientated databases

In this database, every entry is the realization of a class. The objects respectively the class entities are saved as they are in the database. The entities are addressed by their label.

Advantages:

- If object-orientated programming is used, classes of the program/software can be saved to or loaded from the database straight forwarded without an ETL process.
- Abstract classes can standardize subclasses, like in the example every instance of person could be forced to have a name and an id (for example).
- The database model consists – in ideal circumstances – out of one, maybe two parent classes and an arbitrary number of derived child classes.

```
person---student;
```

```
person---professor;
```

Disadvantages:

- Object-orientated databases are very specific to their classes.
- It is difficult to adapt such databases to new requirements.
- They are very fast if the classes should be loaded completely to the program, but very slow, if only needed partially.
- If the database model consists out of many entirely different classes, the concept of inheritance does not have essential advantages.

Object-orientated databases are interesting in theory. In practice, they can easily be realized by document-orientated or by relational-objective databases, so there is no need for object-orientated database management systems generally.

### Document-orientated databases

As the name indicates, every element of this database is a document. A document can be everything theoretically. Usually, tables or JSON documents are used. Using tables, this database model is related to the relational databases. Using JSONs, we easily can emulate classes and objects like object-orientated database models.

Possible document of a document-orientated database:

```
{  
  class: "student";  
  name: "Max Mustermann";  
  id: "007";  
  studyPrograms: ["History", "Latin"];  
}
```

Advantages:

- Universal in its possible applications. The database model can – theoretically – become very complex, if needed.

- Table-like structures can also contain lists and sub-classes.
- Even pictures and other documents could be saved in their binary form.
- A lot of APIs are also written in XML or JSON and can be loaded or saved straight forward.

Disadvantages:

- Gathering certain information out of the database (like "id" of all "students") is not as fast as relational database can provide those information.

### Graphical databases

Graphical databases are not as concrete as relational databases (composed of tables), object-orientated databases (composed of objects of the based software) or document-orientated databases (composed of documents i.e. indexed information packages). Graphical databases are composed of knots. Those knots can contain any information – mostly tables, too. The knots are connected via directed edges. The edge from knot A to knot B is stored together with the information of knot A and can contain additionally information.

A-->B

B-->A

B-->C

D-->B

A good example of a graphical database is Wikimedia. Here, media as photographs are stored together with their links to their concerning articles in Wikipedia.

Advantages:

- Like relational databases, information can be split into topics.
- The information contained by a knot can be very small (even just one user case).
- The equivalent operation of relational databases (*JOIN*) can be done very fast in graphical databases, as long as combination of data is done along the edges.
- Database management systems allow to optimize edges and (for example) introduce new edges to speed up computation. (A DBMS could introduce new edges A->C, D->A and D->C).

Disadvantages:

- The system is very inflexible. In relational databases, if B and C can be joined, it would not matter if you join B with C or C with B (details ignored here). In graphical databases, a join from C to B is not possible as long as there is no edge from C to B.



## Key-value-databases

The concept of key-value-databases is the most important one of all, because strictly speaking all presented database models are key-value-databases. Key-value-databases are databases, where each key has exactly one value – and you could regard a whole row of a table as one value, a single document as one value or an object as one value, in this sense, every database where entries are uniquely identified by one key is a key-value-database.

Talking about key-value-databases, we mean exactly one value as one variable like an id number or a name string.

| Key | Value  |
|-----|--------|
| 1   | 'John' |
| 2   | 'Lisa' |
| 3   | 'Paul' |

Most times, such tables are extractions of other databases, loaded into active store to be processed further and mainly faster than in the default store.

An interesting extension of the key-value-database is the data dice, that can store more complex information. It is called dice, because the data of a data dice with three keys can be arranged like an actual dice. The table belonging to such a dice could look like this:

| Key1    | Key2 | Key3   | Value  |
|---------|------|--------|--------|
| WS 2019 | John | Math 1 | Passed |
| SS 2019 | John | Math 2 | Failed |
| WS 2020 | John | Math 2 | Passed |

## Interim Conclusion

Even though it was not mentioned explicitly, all four database models have an impact on a database model realisation, in fact:

- Relational databases need special (flat) forms. Ideally, the database model considers this.
- Object-orientated databases uses classes as nodes to save information. The nodes should reflect the concept of inheritance.
- Document-orientated databases are free of constraints. Their universal concept allows any database model structure. Therefore, there are slow according to other concepts.
- Graphical databases are at an advantage, if fixed links are needed between parts of information.
- The key-value-database model is only useful for extracting data and processing it in active store, so it is not considered as base management system of database model.

So, the choice of the database management system has a directly impact on the database model. Of course, having an arbitrary model, its structure can be adapted to each database management system. Considering this relation in the design process of a database model is the best advantage.

## Mixed database management models

Two types of mixed database management models should be mentioned in this context.

## Object-relational database models

Object-relational database models are a mix of relational database models and object-orientated database models (as the name already implies). Basically, those databases work as relational databases, consisting of tables that can be joined by unique keys for each table entry.

Object-relational database models do not differ very much from relational databases concerning how data is stored, but they differ a lot on how data is managed. In an object-relational database model tables can represent classes, while their rows are the objects of these classes. Using those tables, you will have some constraints. For example, creating a new entry in a sub-table will force you to generate a corresponding entry in the parent table.

Furthermore, most realisations of object-relational databases introduce some more data types beside numbers and strings, like sets or lists. This makes the databases way more flexible.

Beside of those two points, object-relational databases can be used like their "big brother".

Advantages:

- All advantages of relational databases.
- Objects of classes can easily be stored and loaded.
- An extended set of data types.

Disadvantages:

- The concept is not as standardized as relational database models, so changing the database management software can be impossible.
- Despite new data types, not all types of data are allowed.

## Multi-model database management systems

To this point the text suggested, that only one database management system can be used for one database model. This is not true. Indeed, in reality it is often a mix of database management systems on which database models are based. For long-term storage often the document-orientated system is the best; while data that is recombined a lot may profit most from relational databases; as mentioned before, loading parts of the desired data into active storage can speed up computation and this is done by key-value-databases or data dices. Indeed, this triple often can be found in modern data warehouse technology, distinguishing between long-term (backup) data, short-term (changing) data and computational used (right now) data.

## Conclusion

For each database model there is the right database management system and to a given database system the database model can be altered without losing any information to fit the database management system. These adjustments can be done after the basic database model is created. It is more easy to consider the later database management system while constructing the database model – especially to consider, which parts of a complex and tall database model should be implemented object-orientated, enabling fast transformations or following paths by linked information.

Of course this means knowing which analyses should be done using which part of the database, especially distinguishing between pro-active and on-demand analyses.

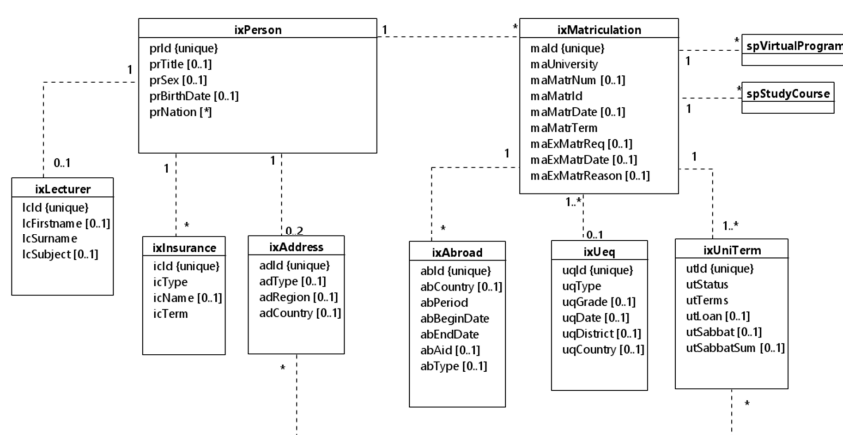
## D. ER-diagram based on the data dictionary version 1.1.1 – published 16.09.2022



### ER-Diagramme

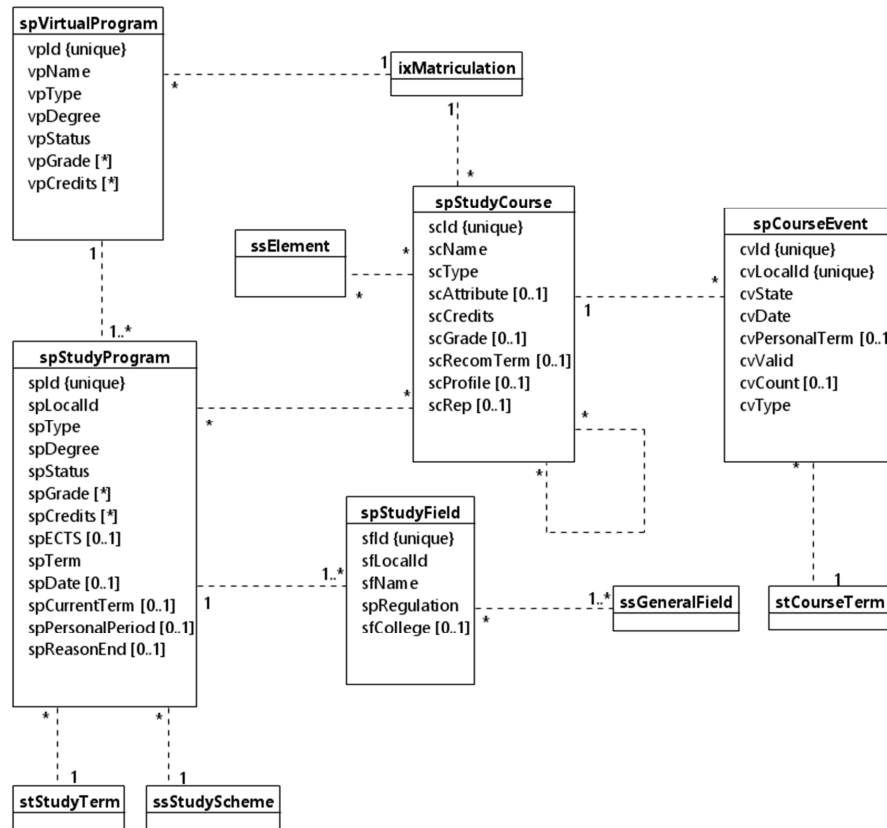
basierend auf dem Data Dictionary v1.1.1.

#### Bereich „Persönliches“



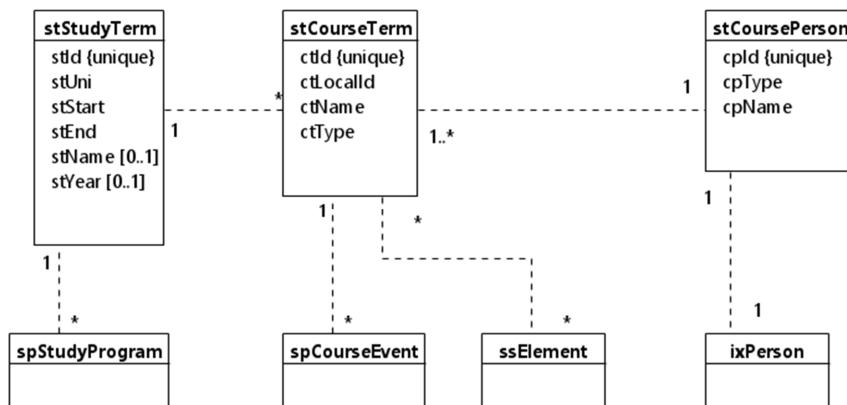
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## Bereich „Studienerfolg“



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## Bereich „Semester/Lehrveranstaltungen“



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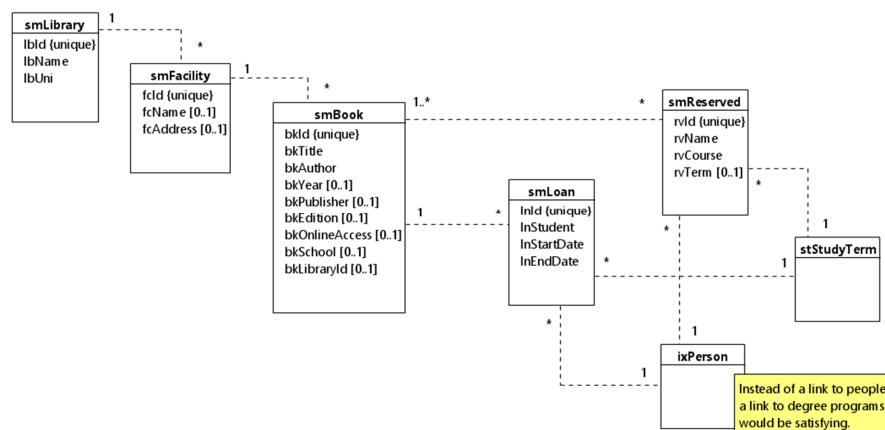
### Bereich „Prüfungsordnungen“

Dieser Bereich wird aktuell überarbeitet.

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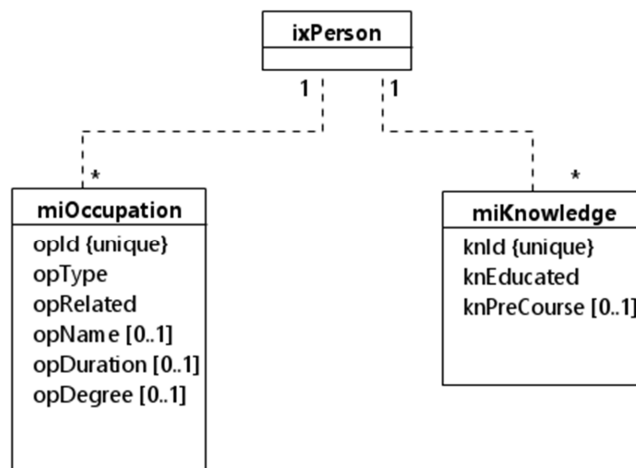
## Bereich „Supplements“

Zurzeit umfasst dies nur Bibliotheksdaten. Moodle-Events sind geplant.



### Bereich „Missing Data / Gewünschte Supplements“

Unter Umständen könnte man diesen Bereich über entsprechende Abfragen von den Studierenden im ‚Study Buddy‘ erhalten.



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## E. Das Daten-Referenz-Modell und die Clearingstelle – a presentation released at 16.08.2022



### KI-basierte Studienverlaufsplanung- und -monitoring

Das Daten-Referenz-Modell und die Clearingstelle.

## Inhalt

1. Was ist ein Daten-Referenz-Modell?
2. Wie teile ich Daten sinnvoll in Gruppen ein?
3. Welche Eigenschaften haben die Variablen?
4. Wie teile ich die Gruppen sinnvoll in Klassen ein?
5. Daten der Gruppe „Persönliches“
6. Daten der Gruppe „Studierendenverlauf“
7. Daten der Gruppe „Aktuelles Semester“
8. Daten der Gruppe „Studierendenordnung“
9. Daten der Gruppe „Sonstiges“
10. Ausblick
11. Bonus: Was ist eine Clearingstelle?

### Hinweis:

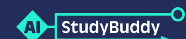
Alle Beschreibungen beziehen sich auf das Data Dictionary (Accordance) v1.0.2 (11.08.2022).

In jüngeren Versionen können Abweichungen zwischen Data Dictionary und dieser Präsentation auftreten.

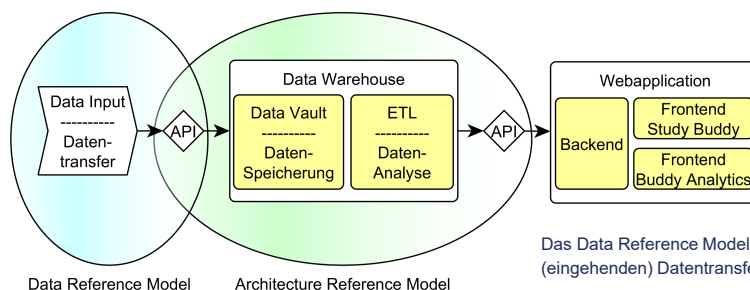
2

16.08.2022

Das Daten-Referenz-Modell und die Clearingstelle.  
J. E. Fuchs, Bergische Universität Wuppertal.



### Was ist ein Daten-Referenz-Modell?



Das Data Reference Model kümmert sich um den (eingehenden) Datentransfer ins Data Warehouse.

Es definiert Art und Form der Daten und beschreibt den Übertragungsweg (API).

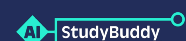
Dabei ist es gänzlich unabhängig von der lokalen Infrastruktur (nicht im Diagramm).

Wie die Daten vor dem Transfer gesammelt und in die vom Referenzmodell vorgegebene Form gebracht werden, ist dem lokalen Anwender überlassen.

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Das Daten-Referenz-Modell und die Clearingstelle.  
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### Was ist ein Daten-Referenz-Modell?

Wir alle kennen Daten-Referenz-Modelle:

Name: \_\_\_\_\_ Vorname: \_\_\_\_\_  
 Adresse: \_\_\_\_\_  
 PLZ: \_\_\_\_\_ Wohnort: \_\_\_\_\_

Dabei ist Name eine Zeichenfolge aus den Buchstaben A bis Z, ebenso der Vorname, nur dass hier mehrere Zeichenfolgen erlaubt sind.

Adresse muss aus einem gültigen Straßennamen mit einer Zahl an zweiter Stelle bestehen.

Wohnort muss einer Ortschaft entsprechen.

PLZ ist eine fünfstellige Nummer, die zu Ortschaft und Straße passen muss.

Das Ausfüllen eines Formulars ist uns so geläufig, dass wir gar nicht mehr wahrnehmen, dass ein Referenz-Modell dahintersteht.

Wie gut ist das Modell? Erweitern wir es um ein Item:

Telefon \_\_\_\_\_

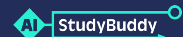
Ist Festnetz oder Mobiltelefon gemeint? Mit Vorwahl oder ohne? Die Internationale Vorwahl mit 00 oder mit +?

Die Darstellung der Telefonnummer ist nicht genau definiert. Das Daten-Referenz-Modell weist also Lücken auf.

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### Was ist ein Daten-Referenz-Modell?

Ein Daten-Referenz-Modell besteht aus einer Reihe von Dokumenten:

- **Datenhandbuch/data compendium:**  
es formuliert den Rahmen des Referenz-Modells; es dokumentiert die Herkunft der Daten; grundlegende Datenprinzipien; erklärt die verschiedene Datentypen; etc.
- **Datenlexikon/data dictionary:**  
es listet alle verfügbaren Variablen des Referenz-Modells auf; gibt Typen und Standardwerte an; dokumentiert Beziehungen zwischen Variablen; etc.
- **Datenkonkordanz/data accordance:**  
es erweitert das Datenlexikon um eine Zuordnung von lokalen Variablen bei den Projektpartnern zu den allgemeinen Variablen des Datenlexikons.
- **Objektbeziehungsdiagramm/ER diagram:**  
Diagramme, die die Beziehungen zwischen den Variablen grafisch darstellen.

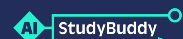
Optional zählt man zum Daten-Referenz-Modell auch folgende Dokumente:

- **VVT/TOM Vorlagen:**  
Das Verzeichnis von Verfahrenstätigkeiten zusammen mit den technischen und organisatorischen Maßnahmen regelt den Datenschutz, den Datenzugriff und die rechtliche Grundlage der Datenverarbeitung.
- **Schnittstellenbeschreibung („Input“):**  
sie beschreibt, wie die Daten des Referenz-Modells ins Basissystem übertragen werden. Für die Beschreibung ist ein Dokument – die eigentliche Definition – essentiell, zwei weitere selbst wieder optional:
  - Die technische Beschreibung der Schnittstelle.
  - Empfehlungen/Tipps zur Installation der lokalen Komponente der Schnittstelle.
  - Meta-Beschreibung der lokalen Infrastruktur (lokales Warehouse/Lakehouse) zur Speicherung der Daten.

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### Was ist ein Daten-Referenz-Modell?

Die beiden zentralen Elemente eines Daten-Referenz-Modells sind das *Datenhandbuch* und das *Datenlexikon*. In unserem Minimalbeispiel würde beides so aussehen:

#### **Datenhandbuch:**

Die Anschrift einer Person wird erhoben. String-Variablen sind Zeichenketten, bei denen A-Z, a-z, 0-9, Ä, Ö, Ü, ä, ö, ü, ß, - und das Leerzeichen erlaubt sind. Integer sind natürlich Zahlen > 0.

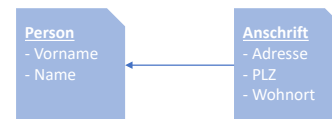
#### **Datenlexikon:**

| Label   | Typ     | Beschreibung            | Bedingung                       |
|---------|---------|-------------------------|---------------------------------|
| Adresse | String  | Straße und Hausnummer   |                                 |
| Name    | String  | Familienname der Person |                                 |
| PLZ     | Integer | Postleitzahl            | Muss zu Adresse und Ort passen. |
| Vorname | String  | Vorname(n) der Person   |                                 |
| Wohnort | String  | Ortschaft               |                                 |

In einem klassischen Datenlexikon sind die zu Verfügung stehenden Variablen in einer Tabelle alphabetisch nach ihrer Labelbezeichnung angeordnet.

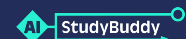
Das Datenlexikon dient allein dazu, die Variablen zu definieren. Ihre Beziehungen werden durch ER-Diagramme dargestellt.

#### **ER-Diagramm:**



Das *Datenlexikon des Projekts* weicht von dieser Systematik ab. In der „Findungs“-Phase der Variablen ist das Erstellen von ER-Diagrammen zu aufwendig. Daher übernimmt das Datenlexikon die Aufgabe, Variablen in Gruppen und Klassen zu unterteilen und ihre Beziehungen zu dokumentieren.

6 16.08.2022 Das Daten-Referenz-Modell und die Clearingstelle.  
J. E. Fuchs, Bergische Universität Wuppertal.



### Wie teile ich Daten sinnvoll in Gruppen ein?

Der erste Schritt ist es, Daten in sinnvolle *Gruppen* einzuteilen. „Sinnvoll“ kann man bei einem vollständigen Variablenset mathematisch testen.

In der Phase, wo Variablen erst noch identifiziert und auf ihre Nutzbarkeit geprüft werden müssen, versagt eine algorithmische Konstruktion von Gruppen.

Wir nutzen eine *semantische Definition einer Gruppe*:

„Eine Gruppe von Variablen besteht aus einer oder mehreren Variablen, welche für sich genommen eine Sinneinheit bilden, d.h. welche zwar Verbindungen zu anderen Gruppen haben kann, aber auch ohne eine Verbindung zu einer anderen Gruppe umfangreiche Auswertungen ermöglicht.“

Die Variable Telefonnummer bildet keine eigene Gruppe zu unserem Beispiel. Vielmehr gehört sie zu der Gruppe Person/Anschrift. Dagegen kann man Busverkehrsdaten des ÖPNV personalisiert oder anonymisiert auswerten. Sie bilden eine eigene Gruppe.

Im Projekt haben wir folgende Gruppen identifiziert:

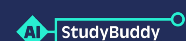
| Name              | Beschreibung                                                                                                 |
|-------------------|--------------------------------------------------------------------------------------------------------------|
| Persönliches      | Alles, was eine Person, nicht aber ihren Studiengang betrifft (Name, Anschrift, Matrikelnummer, HZB, GKV...) |
| Studierendendaten | Alle Studienleistungen eines Studienganges einer Person (Abschluss, Fächer, Module, Noten,...).              |
| Semesterdaten     | Alle Daten und Veranstaltungen eines Semesters (Vorlesungszeiten, Veranstaltungen, Lehrende,...)             |
| Prüfungsordnungen | Die Prüfungsordnungen und Modulhandbücher eines Studienganges.                                               |
| Sonstiges         | Alles, was nicht in die ersten vier Gruppen passt.                                                           |

#### Hinweis:

Die Einteilung in Gruppen orientiert sich daran, in welchen „Paketen“ die Daten in das Data Warehouse eingespeist werden können.

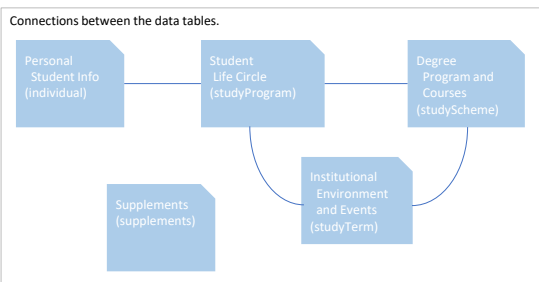
Die Einteilung orientiert sich *nicht* an den späteren Verwendungszwecken oder ist an Analysen angepasst. Vielmehr ist die Datenaufbereitung „Aufgabe“ des Data Warehouses (nach dem Import).

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### Wie teile ich Daten sinnvoll in Gruppen ein?

Man sieht direkt, die Gruppen sind natürlich eng verzahnt. Es dürfen nur Veranstaltungen angeboten werden, die in der Prüfungsordnung stehen. Studierende können nur in tatsächlich angebotenen Veranstaltungen Leistungen erbringen. Hinter jeder Studienleistung steht auch eine Person, die sie erbringt, usw.



Aber um Studierendenleistungen analysieren zu können, brauche ich keine Informationen über die Prüfungsordnung, den stattgefundenen Veranstaltungen oder den Personen, die diese Leistungen erbracht haben. Es würde ausreichen innerhalb dieser Gruppe zu bleiben, und die Studierendenleistungen untereinander zu vergleichen.

Ein weiteres Beispiel: um zu analysieren, welche Personen sich an Hochschulen einschreiben, benötige ich allein die Informationen aus der Gruppe Persönliches/Personal Student Info.

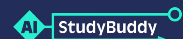
So gibt es zu jeder Gruppe viele Beispiele, wie diese als echte unabhängige Gruppe aufgefasst werden können.

Wenn ich tiefere Sachverhalte aufzeigen möchte – welche Personen zum Beispiel bessere oder schlechtere Leistungen erbringen – greifen natürlich die Beziehungen zwischen den Gruppen, die zum Beispiel Studierendenleistungen mit Hochschulzugangsberechtigungen in Verbindung bringen.

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### Welche Eigenschaften haben Variablen?

Der Sinn eines Datenlexikons ist es, Variablen zu beschreiben. Beschrieben werden sie meist in Tabellenform, die eine Reihe von Eigenschaften definiert.

In unserem Minimalbeispiel waren diese Eigenschaften:

- Label
- Typ
- Beschreibung
- Bedingung

Dies sind die Basiseigenschaften eines jeden Datenlexikons. Sie sollten ausreichen, um eine Datenbank aufzubauen, welche die vom Datenlexikon beschriebenen Variablen aufnehmen kann.

Diese Liste ergänzt man aber um jede mögliche Eigenschaft, die man persönlich für nennenswert erachtet. Die Liste der Eigenschaften eines Datenlexikons ist also immer speziell an das Projekt geknüpft.

Im Folgenden werden die Eigenschaften der Variablen unseres Projektes im Einzelnen vorgestellt. Ein Vorwort noch dazu:

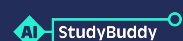
Die Tabellenspalte mit der Überschrift *laufende Nummer/seqNum* bildet keine Eigenschaft der Variablen ab. Es handelt sich lediglich um die laufende Aufzählung der Zahlen von 1 bis zur letzten Reihe einer Tabelle.

So können die Einträge der Tabelle mittels Sortierfunktionen in eine beliebige Reihenfolge gebracht und später die ursprüngliche Reihenfolge (seqNum von 1 bis zum Ende) wieder hergestellt werden.

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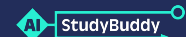


### Welche Eigenschaften haben Variablen?

| Eigenschaft   | Beschreibung                                                                                |
|---------------|---------------------------------------------------------------------------------------------|
| uniqueID      | Einheitlicher Bezeichner der Variablen, welche sich auch in anderen Versionen nicht ändert. |
| variable      | Einheitlicher Bezeichner der Variablen, abhängig von seiner Gruppe und Klasse.              |
| label         | Eine kurze Beschreibung der Variablen.                                                      |
| type          | Der Datentyp der Beschreibung.                                                              |
| rangeOrValues | Der Wertebereich oder die Kategorien des Typs.                                              |
| example       | Ein kurzes Beispiel für die Variable.                                                       |
| calculated    | Wird oder kann die Variable aus anderen berechnet werden?                                   |
| privacy       | Die Datenschutzbeschränkung der Variablen.                                                  |
| mandatory     | Wird die Variable für die Basisanalysen gebraucht?                                          |
| reasonOfUse   | Warum wird die Variable gebraucht?                                                          |
| scope         | Die Klasse der Variable.                                                                    |
| parent        | Die Elternklasse der Variable.                                                              |
| description   | Eine Beschreibung der Variablen.                                                            |

| Eigenschaft  | Beschreibung                                                                |
|--------------|-----------------------------------------------------------------------------|
| constraints  | Bedingungen, welche die Variable erfüllen muss.                             |
| comment      | Kommentierungen der Variable.                                               |
| buwVariable  | Wie heißt die Variable im Datensatz der BUW?                                |
| rubVariable  | Wie heißt die Variable im Datensatz der RUB?                                |
| rwthVariable | Wie heißt die Variable im Datensatz der RWTH?                               |
| junction     | Welche Probleme treten auf, wenn die drei Datensätze zusammengefügt werden? |
| FirstVersion | In welcher Version des Datenlexikons taucht die Variable zuerst auf?        |
| FirstDate    | An welchem Tag wurde die Variable erstellt?                                 |
| FirstAuthor  | Welche Person hat die Variable erstellt?                                    |
| UpVersion    | In welcher Version des Datenlexikons wurde die Variable zuletzt geändert?   |
| UpDate       | Wann wurde die Variable zuletzt geändert?                                   |
| UpAuthor     | Durch wen wurde die Variable zuletzt geändert?                              |
| Deprecated   | Ist die Variable für die Analysen überflüssig?                              |

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### Welche Eigenschaften haben Variablen?

Am Feld *Deprecated/Überholt*, welche Variablen markiert, die nicht mehr gebraucht werden, lässt sich eine weitere Besonderheit dieses Datenlexikons erkennen.

Es geht **nicht** darum aufzulisten, welche Variablen für Analysen verwendet werden, was das Ziel eines klassischen Datenlexikons wäre.

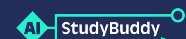
Es geht darum aufzulisten, welche Variablen in den Campus-, Prüfungs- und weiteren Managementsystemen einer Universität **vorhanden** sind, deren Nutzung also **möglich** wäre.

Beispiel:

Das Item „Namen der Krankenkasse“ scheint eines zu sein, dass auf den ersten Blick sich nicht für eine Auswertung von Studierendendaten eignet. Es ist aber in den Datenbanken der Universitäten **vorhanden**, also wird es im Datenlexikon aufgelistet.

Falls es für keine Analyse genutzt wird, dann würde dieses Item tatsächlich aus dem Daten-Referenz-Modell des Endproduktes des Projektes entfernt werden. Bis dahin bleibt es aber als Item gelistet, über das man verfügen könnte.

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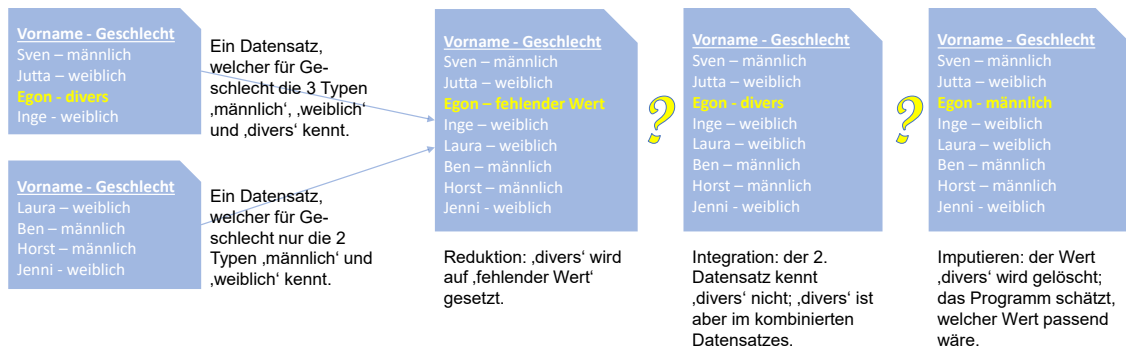
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### Welche Eigenschaften haben Variablen?

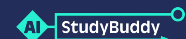
Bevor die Variablen genutzt werden können, müssen sie allerdings bereinigt oder „ge-cleared“ werden. Dieser Prozess heißt auch Standardisierung.

Einem solchen Clearing (nicht verwechseln mit Daten-Cleaning) müssen sich nur Variablen unterziehen, die festgesetzte Werte annehmen können (wie zum Beispiel das Geschlecht), wo sich aber die Möglichkeiten für diese Werte an den unterschiedlichen Standorten variieren (bis zu vier Geschlechter möglich: männlich, weiblich, divers, unbekannt).

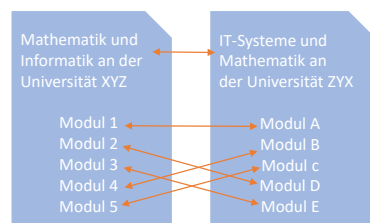
Dieser Prozess ist nicht trivial. Er ist in hohem Grade willkürlich, denn es besteht immer die Möglichkeit, Werte zu reduzieren, Werte zu integrieren oder Werte zu imputieren. Für Reduktion, Integration und Imputation folgt ein Beispiel.



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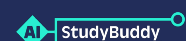
### Welche Eigenschaften haben Variablen?



Besonders interessant ist dieser Prozess beim Clearing der Studiengangsdaten. Vom Typ her haben wir Studiengänge, die identisch aufgebaut sind (Studiengänge bestehen aus Modulen, in denen Nachweise zu erbringen sind).

Hier bedarf es aber ebenfalls einem inhaltlichem Matching. Konkret bedeutet das, durch spezielle Techniken werden Studiengänge zu Studiengängen und deren Module zu Modulen zugeordnet, so dass für ein Studiengang ein Gesamtdatensatz (d.h. ein Datensatz, der Daten aller drei Standorte einschließt) entsteht.

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### Wie teile ich die Gruppen sinnvoll in Klassen ein?

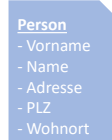
Variablen sind nicht nur in Gruppen eingeteilt, sondern innerhalb ihrer Gruppen auch in Klassen, sogenannte **Scopes**.

Die Regeln für Klasse sind simpel:

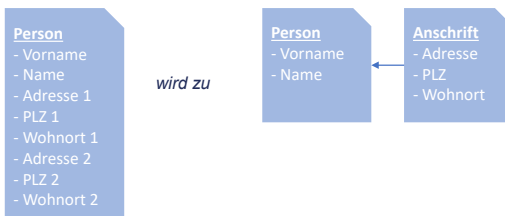
1. Alle Variablen einer Gruppe gehören anfangs zur selben Klasse.
2. Doppelt sich eine Variable in einer Klasse, so erzeugt sie eine Unterklasse.
3. Hat eine Variable eine Beziehung zu einer Klasse, welche die restlichen Variablen nicht teilen, dann erzeugt sie eine Unterklasse.
4. Ist es sinnvoll, eine Variable thematisch von den anderen Variablen zu trennen, erzeugt sie eine Unterklasse.

Dabei ist Regel 4 deutlich freier in der Interpretation als die anderen drei Regeln.

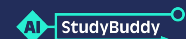
Beispiel 1:  
Alle Variablen einer Gruppe gehören zu einer Klasse.



Beispiel 2:  
Variablen doppeln sich und erzeugen so neue Klassen.



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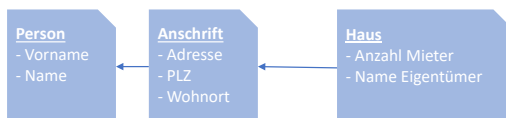


### Wie teile ich die Gruppen sinnvoll in Klassen ein?

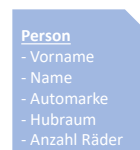
Beispiel 3:  
Bezüge erzeugen neue Klassen. D.h. eine bestehende Klasse wird zu unserer in Bezug gesetzt. Diese neue Klasse bezieht sich allerdings nur auf einen Teil unserer Variablen und nicht auf alle. Daher empfiehlt sich die Aufteilung.



wird zu



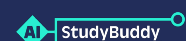
Beispiel 4:  
Häufig macht es Sinn, Variablen zu trennen, besonders dann, wenn Variablen nicht mehr in unmittelbarem Bezug miteinander stehen. Jede Person hat einen Vornamen und einen Nachnamen (zumindest in Deutschland), hier besteht ein unmittelbarer Bezug. Aber nicht jede Person besitzt z.B. ein Auto.



wird zu



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### Wie teile ich die Gruppen sinnvoll in Klassen ein?

Im Folgenden werden die Klassen der einzelnen Gruppen kurz vorgestellt.

Dabei wird **nicht** auf die einzelnen Variablen eingegangen. Es werden aber (zufällig ausgewählte) Beispiele für Variablen genannt.

Primär aber soll die **Struktur** und das **Klassensetting** der Daten erklärt werden.

Um zu erfahren, welche Variablen genau im Projekt zu Verfügung stehen, dient einzig das **Datenlexikon**, das zu diesem Zweck ständig aktualisiert wird.

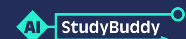
Grundsätzlich sollen **ER-Diagramme** die zu Verfügung stehenden Daten und ihre Beziehungen abbilden. Solche Diagramme zu erstellen macht erst Sinn, wenn eine (sich mehr oder weniger nicht mehr verändernde) Endversion eines Katalogs an Daten besteht.

Dieses Dokument bildet die Klassenstruktur von August 2022 ab. Es ist nicht ausgeschlossen, dass sich diese Struktur in neueren Versionen ändert.

Das Datenlexikon ist darauf ausgelegt, neue Variablen aufzunehmen. Wodurch auch neue Klassen entstehen können, und ganz Variablen Informationen aus ganz neuen Bereichen abdecken können.

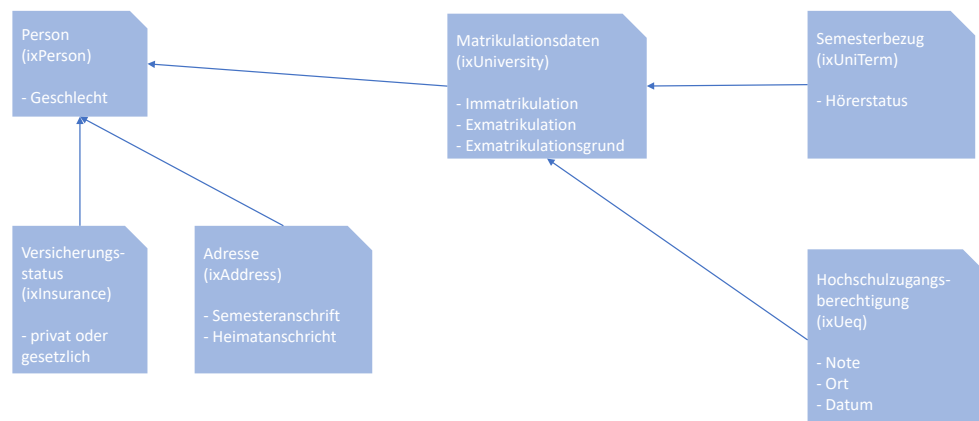
Besonders der Bereich „Sonstiges Variablen“ ist zur Zeit leer. Hier ist ein starker Zuwachs an neuen Variablen zu erwarten.

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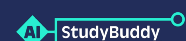


### Daten der Gruppe „Persönliches“

(in Klammern die Bezeichnung des **Scope** aus dem Datenlexikon, darunter mit Spiegelstrich **Beispielvariablen**)

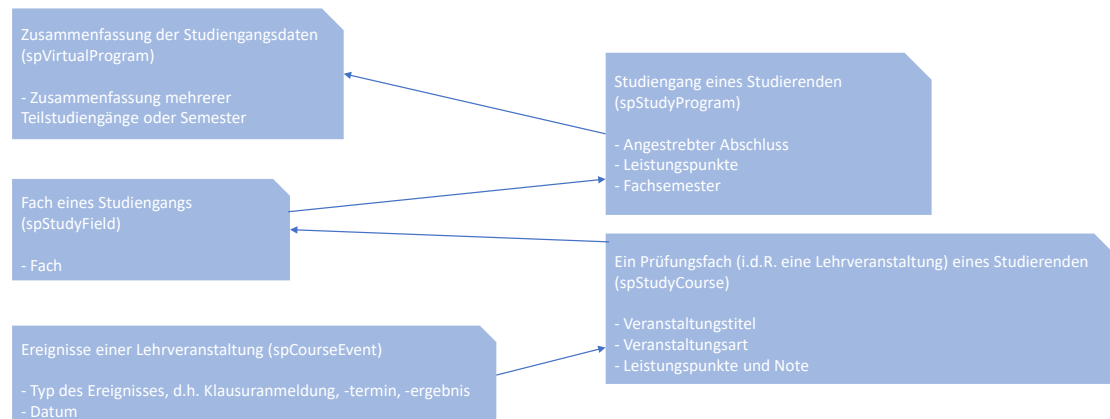


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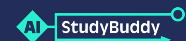
### Daten der Gruppe „Studierendenverlauf“

(in Klammern die Bezeichnung des **Scope** aus dem Datenlexikon, darunter mit Spiegelstrich **Beispielvariablen**)



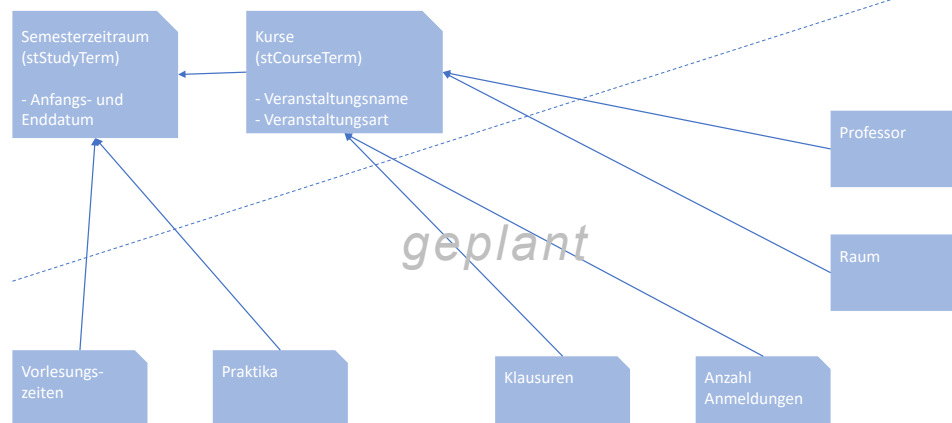
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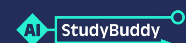
### Daten der Gruppe „Aktuelles Semester“

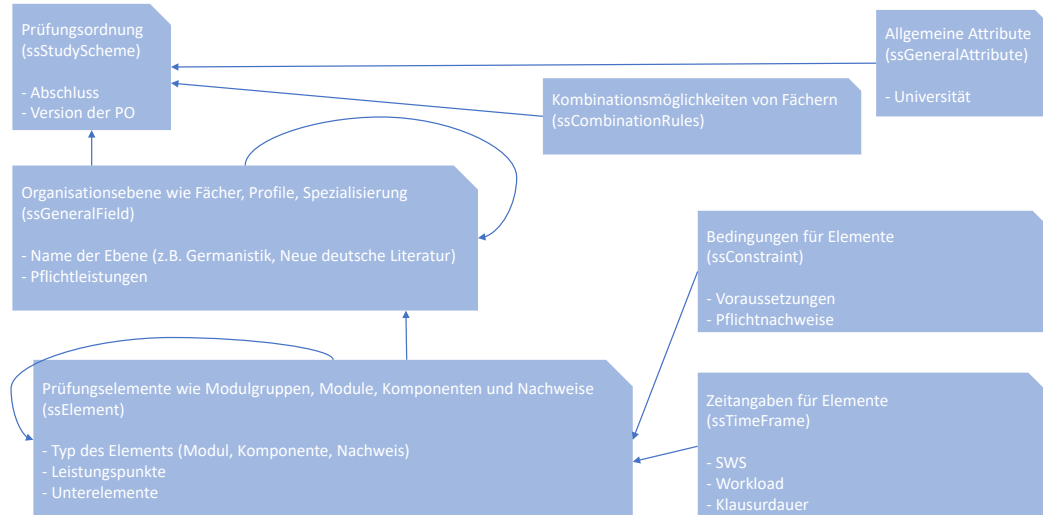
(in Klammern die Bezeichnung des **Scope** aus dem Datenlexikon, darunter mit Spiegelstrich **Beispielvariablen**)



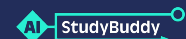
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**Daten der Gruppe „Studierendenordnung“**(in Klammern die Bezeichnung des **Scope** aus dem Datenlexikon, darunter mit Spiegelstrich **Beispielvariablen**)

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Das Daten-Referenz-Modell und die Clearingstelle.  
J. E. Fuchs, Bergische Universität Wuppertal.**Daten der Gruppe „Studierendenordnung“**

Zu der Klassenstruktur der Prüfungsordnungen:

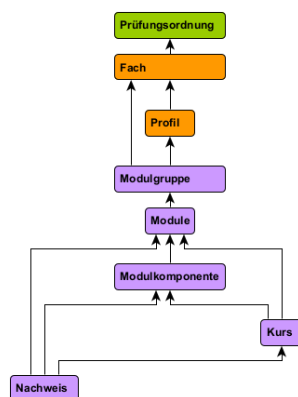
Auf dieser Seite sieht man die schematische Darstellung von Prüfungsordnungen, wie sie in 95% aller Fälle an der BUW zum Einsatz kommt.

Andere Universitäten strukturieren ihre Prüfungsordnungen allerdings anders. Dabei ist es wichtig, eine Struktur für alle Universitäten zu finden.

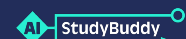
Ohne Beweis dafür wird davon ausgegangen, dass die Struktur aus Prüfungsordnung, Organisationsebene und Prüfungselemente jede Struktur an jedem Standort abbilden kann.

Um beim Beispiel Wuppertal dies zu verdeutlichen: Prüfungsordnung wäre natürlich die Prüfungsordnung; Fach und Profil wären Organisationsebenen; Modulgruppe, Module, Modulkomponenten, Kurse und Nachweise wären allesamt Prüfungselemente.

Durch die Selbstreferenz können so viele Organisationsebenen und Prüfungselemente eingebaut werden, wie benötigt werden.



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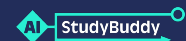
### Daten der Gruppe „Sonstiges“

Die Gruppe „Sonstiges“ führt noch keine Variablen auf.

Für die Zukunft geplant sind aber folgende Daten:

- Daten aus Moodle
  - Informationen über Veranstaltungen
  - Informationen über das Lernverhalten der Studierenden
- Daten aus den Bibliothekssystemen (ALMA)
  - Informationen über Bücher, die für Veranstaltungen besonders frequentiert werden.
  - Rückschlüsse auf das Lernverhalten der Studierenden durch ihr Nutzerverhalten.
- Daten aus den QM Systemen (EvaSys) der Universitäten

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### Ausblick

Die Erstellung des Daten-Referenz-Modells besteht aus zwei Phasen:

#### 1. Daten katalogisieren:

Jede mögliche Variable, die sich in den Prüfungs-, Campus-, Studierenden-, und Lernmanagementsystemen befindet und auf welche das Projekt Zugriff bekommen könnte, wird katalogisiert – unabhängig von irgendeiner Fragestellung, besonders unabhängig bezüglich Nutzbarkeit, Datenschutz oder ethischen Bedenken.

#### 2. Daten konsolidieren:

Nun werden die Daten geprüft:

- Wird ein Datenitem für eine Analyse genutzt?
- Können wir das Item Datenschutz-konform nutzen?
- Ist es ethisch unbedenklich, das Item zu nutzen?
- Brauchen wir die Zustimmung des Nutzers?
- Kann aus dem Item ein anderes abgeleitet werden, dass auf diese Punkte geprüft werden muss?

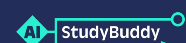
Nach diesem Prinzip werden die Daten geprüft und unbrauchbare Items aussortiert.

Was sind die nächsten Schritte?

**Wir befinden uns noch in Phase 1, d.h.**

- Alle Datenbanksysteme der Universitäten werden darauf geprüft, ob sie Variablen enthalten, die aktuell im Datenlexikon fehlen.
- Bei den im Datenlexikon aufgeführten Variablen prüft jede Universität für sich, ob diese Variable in ihren (lokalen) Datenbanksystemen auftauchen. **Besonderer Fokus liegt dabei auf Variablen, die als „mandatory“ gekennzeichnet sind.**
- Es werden „Datenbankproben“ gesammelt und die Datenitems der drei Standorte miteinander abgeglichen, z.B. das Item Geschlecht: wie viele verschiedene Werte kann es annehmen?
- Datenschutzfreigaben werden eingeholt, so dass Katalogisierung und Abgleich funktionieren können, aber auch in Vorbereitung für die spätere Freigabe von Daten ins Produktivsystem.

23 16.08.2022 Das Daten-Referenz-Modell und die Clearingstelle.  
J. E. Fuchs, Bergische Universität Wuppertal.



**Bonus: Was ist eine Clearingstelle?**

Der Begriff "Clearing-House" [oder Clearingstelle] bezeichnete ursprünglich ein Bankhaus, in welchem Schecks und Rechnungen verschiedener Banken verrechnet werden konnten, so dass am Ende nur der Nettobetrag zwischen den Banken ausgetauscht werden musste. Heutzutage hat sich der Begriff massiv erweitert, und bezeichnet eine jede Stelle, die den Austausch von Gütern, Dienstleistungen oder Informationen regelt.

Ein anschauliches Beispiel für eine Clearingstelle ist die Clearingstelle für Verkehr des Instituts für Verkehrsforschung (DLR). Sie sammelt die „zahlreich(en) und vielfältig(en) [...] Statistiken, empirische Studien und Mobilitätshebungen. Viele relevante Datenquellen sind oft nur einer kleinen Gruppe gut informierter Nutzer bekannt, oder aber ihre Einsatzmöglichkeiten sind durch unzureichende methodische Zusatzinformationen eingeschränkt“ ([www.dlr.de](http://www.dlr.de), Stand 16.08.2022).

Dabei verfolgt die Clearingstelle für Verkehr des DLR drei Hauptziele:

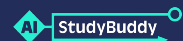
- Standardisierung von Datensätzen (Metadaten, Datenbeschreibungen).
- Bereitstellung von Datensätzen.
- Sammeln von Datensätzen einschließlich der Möglichkeit für Dritte, ihre Daten über das DLR zu Verfügung zu stellen.

Gerade die Standardisierung von Datensätzen ist dabei die nicht trivial Aufgabe, da aus ungefähr 20 Primärquellen unzählige, verschiedene Datenbankbeschreibungen harmonisiert und zusammengeführt werden müssen. Zu diesem Zweck nutzt das DLR seine eigene Daten-Referenz-Architektur

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**Bonus: Was ist eine Clearingstelle?**

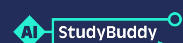
Die Deutsche Gesellschaft für Technische Zusammenarbeit definiert dabei folgende Punkte für den **Clearing-House-Mechanismus** (angepasst auf das Projekt AIStudyBuddy):

- Informationsaustausch:  
Sicherer und datenschutzkonformer Datenaustausch zwischen den Hochschulen und hochschulübergreifende Zusammenführung der Daten (durch das Daten-Referenz-Modell und die Datenschutzvereinbarung). Bereitstellung von Teildatensätzen für wissenschaftliche Forschungsvorhaben.
- Zusammenarbeit:  
Verstärkung der wissenschaftlichen Zusammenarbeit sowie der Zusammenarbeit von Studiengangdesignern, Studierendenberatungen und administrativen Stellen. Der AIStudyBuddy soll über die Clearingstelle Studierendenschaft, Verwaltung und Wissenschaft näher zusammenbringen.
- Netzwerkentwicklung:  
Ansprechpartner des AIStudyBuddy, sowohl für teilnehmende Hochschulen und Hochschulen, die an einer Teilnahme interessiert sind, als auch für Nutzer (Studierende und Studiengangdesigner). Weitere Vernetzung mit Projekten von ähnlichem Charakter (DH.NRW und AG Openness).
- Transparenz:  
Selbstverpflichtung über die ethische Nutzung der Daten, Datenschutzvereinbarung, Verzeichnisse der Verarbeitungstätigkeiten (VVT), Offenlegung der Analysemethoden (Referenzarchitektur), Offenlegung der Art der verwendeten Daten (Datenmodell), Consent Management

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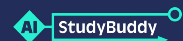
**Bonus: Was ist eine Clearingstelle?**

Die NRW-Clearingstelle des Projekts AIStudyBuddy befindet sich noch in Planung.

Folgt man dem Modell der DLR, so wird es sich neben Study Buddy und Buddy Analytics um ein drittes Frontend handeln: ein Portal zur Einsicht des Datenreferenz- und Architekturreferenzmodells und zur Beantragung von Datenauszügen zwecks Forschungsvorhaben.

Darüber hinaus würde es Möglichkeiten über die Teilhabe am (verstetigten) Projekt aufzeigen, Ansprechpartner benennen und über das Projekt informieren.

26 16.08.2022 Das Daten-Referenz-Modell und die Clearingstelle.  
J. E. Fuchs, Bergische Universität Wuppertal.



## Vielen Dank!

**Joel Emanuel Fuchs**

Uniservice QSL - Qualität in Studium und Lehre  
Dezernat für Studium, Lehre und Qualitätsmanagement  
Bergische Universität Wuppertal

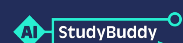


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jfuchs@uni-wuppertal.de

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| Projektpartner:                                                                                                                                                                                                                                             | Förderer:                                                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| <br><br> | <br>Bundesministerium<br>für Bildung<br>und Forschung |

## F. Bachelor degree program with three major subjects.

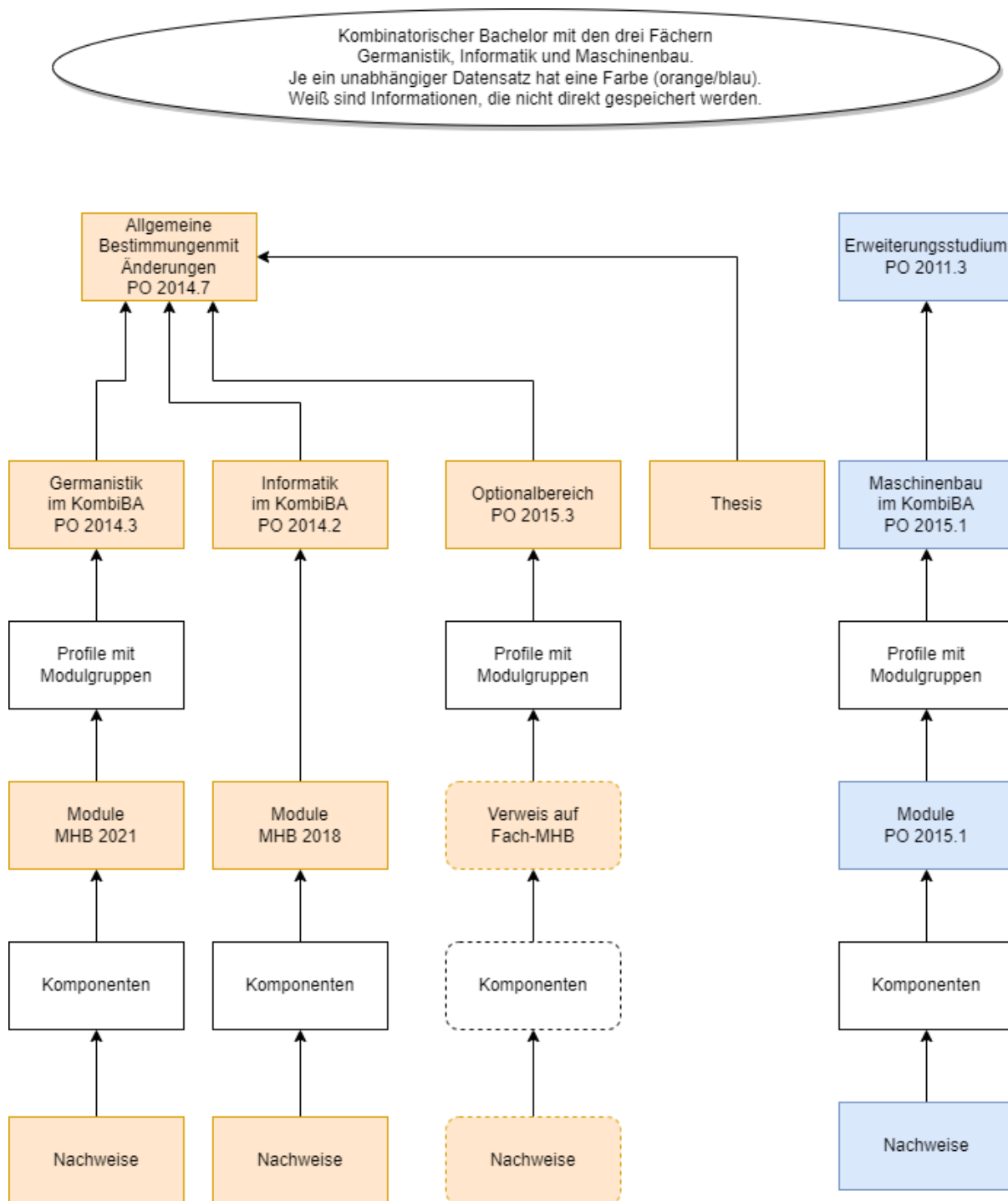


Figure 10.1.: Combination of three major fields to achieve the Bachelor degree.

This graphic shows, how three major subjects can be combined to achieve the bachelor degree and afterwards the Master of Education. Two points are important in this graphic: *six* different examination regulations (*Prüfungsordnungen/PO*) are applied for just one bachelor degree. And there are no examination regulations that hierarchically are joining the double major bachelor degree (orange part) and the third major examination regulations (blue part). For a correct mapping of a threefold major bachelor, a ‘virtual’ instance hierarchically above the two examination regulations *PO2014.7* and *PO2011.3* has to be ‘installed’.



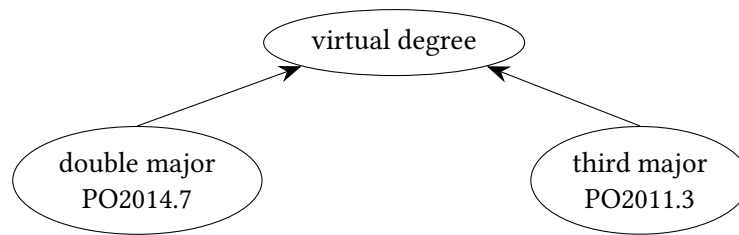


Figure 10.2.: A virtual degree as overhead to join the both independent degree programs.

## G. A note from GIT – AP04: Moodle (Issue 37)

 Closed
  Issue created 1 year ago by  Joel E. Fuchs (BUW/QSL)
 Reopen issue

### AP04: Moodle

Da an allen drei Standorten Moodle im Einsatz ist, sollte sich das Projekt die Frage stellen, inwieweit diese Datenquelle für **StudyBuddy** oder **BuddyAnalytics** eingesetzt werden kann.

[@fantasticptfox](#) hat die **WebAPI** von Moodle untersucht. Eine Extraktion von Studierenden und Kursen wäre dabei möglich. Interessantere Werte, vor allem zeitliche Verfolgung der Aktivitäten der Studierenden, können auch abgerufen werden, dann aber nur mit einem extra dafür programmierten **Plug-In**. [@rroepke](#) berichtet, dass es eine Eigenentwicklung an der RWTH zum Abruf interner Moodle Tabellen gibt, auf die man aufbauen könnte.

Neben dem technischen Aspekt steht die Frage des analytischen Mehrwertes. Zur **Studiengangsanalyse** würde das Nutzerverhalten der Studierenden in Moodle nur geringen Mehrwert beitragen. Man könnte verfolgen, welche Kurse belegt werden, ohne dass sie später zur Klausur angemeldet werden (d.h. in Moodle auftauchen, nicht aber in den Prüfungssystemen).

Demgegenüber stehen aber sehr kritische Fragen, die vor einer Nutzung von Moodle-Daten geklärt werden müssten:

- Wird von den Lehrenden Moodle flächendeckend eingesetzt?
- Ist die Teilnahme an Moodle-Kursen verpflichtend, um an Prüfungen teilzunehmen?
- Wie ist das Angebot gestaltet? Werden nur Materialien verteilt, oder gibt es einen aktiven Austausch der Kursteilnehmer?
- ... Die Datenqualität in Moodle ist nicht nur an den drei Standorten (BUW/RUB/RWTH), sondern auch in den verschiedenen Fakultäten/Fächern äußerst unterschiedlich und müsste angeglichen werden, bevor sie in eine allgemeine Analyse einfließen könnten.

Das ganze bedeutet, für den analytischen Teil eignen sich Moodle Daten *vermutlich* nicht. Denkt man das Projekt aber weiter, kann man sekundäre Dienste aus den Moodle Daten ableiten. Man kann Studierende darauf hinweisen, dass bestimmte PDFs aus ihren Kursen besonders häufig heruntergeladen wurden. Oder Studienverlaufsplanern mitteilen, dass in dem einen Fach eher Videos angenommen werden, in einem anderen eher PDF-Skripte.

Da also die Thematik **Moodle** aus vier grundlegenden Bereichen besteht -- Feststellung der Datenqualität; Extrahieren der Daten; Dateninterpretation und -mehrwert; Integration in StudyBuddy und BuddyAnalytics -- sollte dies hintenangestellt werden, abhängig davon, wie viele Ressourcen im Projekt bei fortschreitender Entwicklung der Programme noch frei sind.

Gerne kann über die Thematik aber schon diskutiert werden; die von mir postulierten Behauptungen sind weder der Weisheit letzter Schluss, noch müssen die Ansichten korrekt sein. Bitte also entweder den Text direkt abändern, oder Ergänzungen als Kommentare hinzufügen. Vielleicht gibt es an den anderen Standorten dazu schon Ideen oder erste Versuche.

Edited 1 year ago by [Joel E. Fuchs \(BUW/QSL\)](#)

To upload designs, you'll need to enable LFS and have an admin enable hashed storage. [More information](#)

Tasks  0

No tasks are currently assigned. Use tasks to break down this issue into smaller parts.

Linked items  0

Link issues together to show that they're related or that one is blocking others. [Learn more](#).

### Activity

## H. The tree based mapping of examination regulations.

Below we see the formalized representation of the tree model from Section 5.4 in two versions. The first version is a *yaml* file following the *JSON Scheme*<sup>3</sup>. This scheme can describe entities, their attributes, and relations exact and without misunderstandings.

The second version is a plotted version of these *yaml* files by *PlantUML*<sup>4</sup>

### H.1. Version 1 – the *yaml* files

```

1 # ----- #
2 # Examination Regulations Scheme v0.1
3 #
4 # For further description see info:description.
5 #
6 # version: 0.1
7 # created: 23.07.2022
8 #
9 # Authors:
10 # Fuchs, Joel Emanuel (jfuchs@uni-wuppertal.de) / project collaborator, data architect
11 # Stapper, Ronja Maria (ronja.stapper-hk@uni-wuppertal.de) / student assistant
12 #
13 # (c) Copyright by department 6.2, University of Wuppertal, Germany
14 #
15 # ----- #
16 #
17 # Verbundprojekt: KI-basierte Unterstützung zur individuellen Planung und Reflexion
18 # von Studienverläufen sowie (hochschulübergreifendes) Studienmonitoring - AISTudyBuddy
19 # Teilvorhaben: AISTudyBuddy@BUW
20 #
21 # Förderkennzeichen: 16DHBKI017 / BMBF, Referat 412 und PT-VDI/VDE, Arbeitseinheit TZ-MST
22 # Bund-Laender-Initiative KI in der Hochschulbildung / Technologie- und Innovationsfoerderung
23 #
24 # University Service QSL -- Quality in Studies and Teaching
25 # Department of Studies, Teaching and Quality Management
26 # University of Wuppertal
27 #
28 # Gausstrasse 20
29 # D-42277 Wuppertal
30 # Germany
31 #
32 # ----- #
33 # Comments starting with # are permanent.
34 # Comments starting with ### indicate to-do briefings.
35 # ----- #
36 # Abbreviations:
37 # aisb : AISTudyBuddy
38 # drm : Data Reference Model
39 # ers : Examination Regulations Schema
40 #
41 # ----- #
42 ---
43 # ----- #
44 #
45 # |__ ) / \ | \ | | |__ |__ )

```

<sup>3</sup>See <http://json-schema.org/> for more information, last visited on 01.08.2023.

<sup>4</sup>See <https://plantuml.com/> for more information, last visited on 01.08.2023.



```

108     minLength: 1
109     deprecated: false
110 DegreeType:
111     title: "The type of the degree program."
112     description: >
113         "The description of the degree program specifying it further.
114         E.g., description like double-major-program (Kombinatorischer Bachelor),
115         or single-major-program (1-Fach Bachelor), or dual degree programs (Dualer
116         Studiengang)."
```

\$comment : >

```

117     "The combination of Degree, DegreeType and Version shall be unique at a single
118     institution
119     and relate to a single set of examination regulations."
119     type: string
120     minLength: 1
121     deprecated: false
122 Version:
123     title: "Version of the examination rules."
124     description: >
125         "A unique identifier that in combination with Degree and DegreeType
126         match to a single set of examination regulations of a university."
127     $comment : >
128         "The combination of Degree, DegreeType and Version shall be unique at a single
129         institution
130         and relate to a single set of examination regulations."
130     type: string
131     minLength: 1
132     deprecated: false
133 FullName:
134     title: "The name of the degree program."
135     description: >
136         "The official name of the degree program as mentioned in the examination regulations."
137     type: string
138     minLength: 1
139     deprecated: false
140 StandardPeriod:
141     title: "Standard period of a complete degree program."
142     description: >
143         "Number of terms to finish degree program in standard period.
144         Can be altered by personal circumstances / sabbatical or corona."
145     type: integer
146     minimum: 1
147     deprecated: false
148 CreditPoints:
149     title: "Number of credit points needed for finishing degree program."
150     type: integer
151     minimum: 1
152     deprecated: false
153 ProgramSchema:
154     title: "The schema of fields in which the degree program is parted."
155     description: >
156         "The schema of partition of the degree program. This could be just one field,
157         or several variable fields (e.g., field A, field B), or several specific
158         fields (e.g., 'Optionalbereich', 'Thesis')."
159     type: array
160     items:
161         type: string
162         minLength: 1
163     minItems: 1
164     uniqueItems: true
165     deprecated: false
166 MainProgram:
167 # Using if- and AnyOf-phrases to specify the pointer.
```

```

168     title: "A reference to the main program."
169     description: >
170         "Some degree programs allow extension programs (e.g., 'Dritte Faecher',
171           'Ergaenzungsstudium')."
172         These are like half a regular degree program added to an existing degree program.
173         Usually, this concerns only the qualification of teachers."
174     default: null
175     oneOf:
176       - type: null
177       - pointer:
178         $ref: /pointer
179     deprecated: false
180     _self:
181       title: "The address of an instance of this class."
182       $ref: /pointer
183       deprecated: false
184     examples:
185       - Degree: Bachelor of Science
186         DegreeType: "Kombinatorischer Bachelor"
187         Version: "2014.1"
188         FullName: >
189           "Prüfungsordnung (Allgemeine Bestimmungen) für den
190             Kombinatorischen Studiengang Bachelor of Arts
191             an der Bergischen Universität Wuppertal vom 27.03.2014"
192         StandardPeriod: 6
193         CreditPoints: 180
194         ProgramSchema:
195           - Field A
196           - Field B
197           - Optionalbereich = Bildungswissenschaften
198           - Thesis
199         MainProgram: null
200         _self:
201           Type: /program
202           Address: null
203     deprecated: false
204     required:
205       - Degree
206       - DegreeType
207       - Version
208       - FullName
209       - StandardPeriod
210       - CreditPoints
211       - ProgramSchema
212       - _self
213     unevaluatedProperties: false
214 ---
215 # ----- #
216 # |__ | |__ | | \
217 # |  | |__ |__ |__ /
218 #
219 # ----- #
220 "$schema": "https://json-schema.org/draft/2020-12/schema"
221 "$id": "urn:aisb:drm:ers$v0.1/field"
222 title: "Field of degree program"
223 description: >
224     "The field of a degree program. This is a organizational level between the
225     main degree program and the credit points 'generating' elements at the
226     bottom of the 'examination rule tree'. The field sums up related elements
227     or fields."
228 "$comment": >
229     "program and field can be substituted by just one class if the program

```

```

230     specific items are made optional. This will haben in a second step.
231     For now, it is beneficial to separete the two classes for comprehensive reasons."
232 type: object
233 properties:
234     Level:
235         title: "Level of the field."
236         description: >
237             "The level of the field. Fields related to degree programs have level 1,
238             fields of fields have a level up by one as their parent field."
239         type: int
240         minimum: 1
241         deprecated: false
242     LevelName:
243         title: "Name of the Level."
244         description: >
245             "Each level is dedicated to a unique name. This could be 'Fach', or 'Bereich', or else.
246             Consequently, the hierarchy of fields of the examination rules is mapped, like:
247             Teilstudiengang (Fach) -> Bereich -> Unterbereich (Wahlpflicht/Pflicht)"
248         type: string
249         minLength: 1
250         deprecated: false
251     Name:
252         title: "Name of the field."
253         description: >
254             "The name of the field as mentioned in the examination regulations.
255             This can be the name of the subject, or the module group, or the profile, etc."
256         type: string
257         minLength: 1
258         deprecated: false
259     FullName:
260         title: "The official name of the field"
261         description: >
262             "The official name of the field as mentioned in the examination regulations."
263         type: string
264         minLength: 1
265         deprecated: false
266     Version:
267         title: "Version of the examination rules."
268         description: >
269             "A unique identifier that in combination with Name and the information of the head
270             program
271             match to a single set of examination regulations of a university."
272         "$comment" : >
273             "The combination of Name and Version together with
274             Degree and DegreeType (from the head program)
275             shall be unique at a single institution
276             and relate to a single set of examination regulations."
277         type: string
278         minLength: 1
279         deprecated: false
280     CreditPoints:
281         title: "Number of credit points."
282         description: >
283             "The number of credit points that has to be acquired to complete this field.
284             If just one value is mentioned, than the amount of credit points is fixed.
285             If two values are mentioned, than the first one are the minimal credit points
286             that has to be acquired, the second value is the maximum."
287         type: array
288         items:
289             type: integer
290             minimum: 1
291         minItems: 1
292         maxItems: 2

```

```

292     deprecated: false
293   FieldSchema:
294     title: "The schema of fields in which the field is parted."
295     description: >
296       "The schema of partition of the field. This could be just one field or element,
297       or several variable fields/elements (e.g., field A, field B, element C), or several
298       specific
299       fields/elements (e.g., 'Pflichtbereich', 'Profil')."
300     type: array
301     items:
302       type: string
303       minLength: 1
304     minItems: 1
305     uniqueItems: true
306     deprecated: false
307   ParentNode:
308     # Using if- and AnyOf-phrases to specify the pointer.
309     title: "The field's parent node."
310     description: >
311       "Each field is associated to either a program or another field (having
312       a level like its own but down by one)."
313     $ref: /pointer
314     deprecated: false
315   _self:
316     title: "The address of an instance of this class."
317     $ref: /pointer
318     deprecated: false
319   #nice to have requirements depending on level == 1.
320   examples:
321     - Level: 1
322       LevelName: Teilstudiengang (Fach)
323       Name: "Germanistik"
324       FullName: >
325         "Prüfungsordnung (Fachspezifische Bestimmungen)
326         für den Teilstudiengang Germanistik im Kombinatorischen Studiengang
327         mit dem Abschluss Bachelor of Arts
328         an der Bergischen Universität Wuppertal vom 24.09.2021"
329       Version: "2021.1"
330       CreditPoints:
331         - 75
332       FieldSchema:
333         - Pflichtbereich
334         - Profil
335       ParentNode:
336         Type: /program
337         Address: null
338       _self:
339         Type: /field
340         Address: null
341     deprecated: false
342   required:
343     - Level
344     - LevelName
345     - Name
346     - CreditPoints
347     - ParentNode
348     - _self
349   unevaluatedProperties: false
350 ---
351 # ----- #
352 # |__| |__| \\\| |__| \ | |
353 # |__| |__| | | |__| | \ | |

```



```

354 #
355 # ----- #
356 "$schema": "https://json-schema.org/draft/2020-12/schema"
357 "$id": "urn:aisb:drm:ers$0.1/element"
358 title: "Element of a degree program"
359 description: >
360     "The element of a degree program is attached to either a field
361     or another element. Elements are the part of a degree program
362     that let the student achieve credit points. They can aggregate
363     elements like fields could aggregate fields, too. The main
364     difference between fields and elements are, that elements can
365     be 'passed' (or 'failed'), while fields are like areas in the
366     degree program, claiming a set of elements that have to be
367     passed to finish the degree program."
368 "$comment": >
369     "Again, field and element can be substituted by just one class.
370     This will haben in a second step and result in one class for program, field and element.
371     For now, it is beneficial to separate the three classes for comprehensive reasons."
372 type: object
373 properties:
374     Level:
375         title: "Level of the element."
376         description: >
377             "The level of the element. Elements related to a field have level 1,
378             elements of elements have a level up by one as their parent element."
379         type: int
380         minimum: 1
381         deprecated: false
382     LevelName:
383         title: "Name of the Level."
384         description: >
385             "Each level is dedicated to a unique name. This could be 'Modulgruppe', or 'Modul', or
386             else.
387             Consequently, the hierarchy of elements of the examination rules is mapped, like:
388             Modul -> Komponente -> Nachweis"
389         type: string
390         minLength: 1
391         deprecated: false
392     Name:
393         title: "Name of the element."
394         description: >
395             "The name of the element as mentioned in the examination regulations.
396             This can be the name of the subject, or the module group, or the profile, etc."
397         type: string
398         minLength: 1
399         deprecated: false
400     FullName:
401         title: "The official name of the element"
402         description: >
403             "The official name of the field as mentioned in the examination regulations."
404         type: string
405         minLength: 1
406         deprecated: false
407     Version:
408         title: "Version of the examination rules."
409         description: >
410             "A unique identifier that in combination with the identifiers of programs and fields
411             match to a single set of examination regulations of a university.
412             This can be the 'Pruefungsordnung', but also the 'Modulhandbuch'
413             or a 'Studienverlaufsplan'."
414         "$comment": >
415             "An extra class representing PO/MHB/SVP would help to raise the consistency."
416     type: object

```

```

416     properties:
417         Id:
418             type: string
419             minLength: 1
420         Type:
421             type: string
422             enum:
423                 - PO
424                 - MHB
425                 - SVP
426         deprecated: false
427         required:
428             - Id
429             - Type
430     Workload:
431         title: "Workload."
432         description: >
433             "The workload of an element, measured either in credi points (CP)
434             or in labour hours (h)."

```

```

479     Address: null
480 deprecated: false
481 required:
482   - Level
483   - LevelName
484   - Name
485   - FullName
486   - Version
487   - ParentNode
488   - _self
489 unevaluatedProperties: false
490 ---
491 # ----- #
492 #
493 # / \ | | | | \ / \ \ | |
494 # / ~ \ | | | | \ \ \ \ / | \ |
495 #
496 # ----- #
497 "$schema": "https://json-schema.org/draft/2020-12/schema"
498 "$id": "urn:aisb:drm:ers$v0.1/attrNode"
499 title: "A node of an attribute."
500 description: >
501   "Each of the class program, field and element are further
502   specified by attributes. Such attributes can refer to one
503   to three classes. A attribute node will contain these
504   relations. An attached attribute container will carry
505   the attribute content."
506 "$comment": >
507   "attrNode and attrContain can be substituted by one class called attribute.
508   In the first development step it is easier to leave them divided."
509 type: object
510 properties:
511   Owner:
512     title: "Owner of the node."
513     description: >
514       "Either a program, field or element is stating the referred attribute.
515       Either an element (exam) postulate the times of attempts,
516       or a program postulate, that two fields have to be combined, and so on.
517       The class, who postulates a rule, is its owner."
518     $ref: /pointer
519     deprecated: false
520   Subject:
521     title: "The 'active' part of a relation."
522     description: >
523       "Subject is 'null', if object is 'null' *and* subject is owner.
524       The subject is the 'active' part of the relation.
525       For example, if we choose mathematics at a double major program,
526       we are not allowed to combine it by computer science.
527       So, 'mathematics' would be the active, 'computer science' the passive part."
528     $ref: /pointer
529     deprecated: false
530   Object:
531     title: "The 'passive' part of a relation."
532     $ref: /pointer
533     deprecated: false
534   Verb:
535     title: "The type of attribute."
536     description: >
537       "We categorize the different attributes into groups.
538       The groups are mentioned here. It is not necessary to do so,
539       but it is a good helper at constructing the attribute content."
540     type: string
541     enum:

```



```

605     minLength: 1
606     deprecated: false
607   - Type:
608     const: singleObligation
609     description: >
610       "An obligation declared by the owner of the attribute.
611       Because it is a single obligation, there is only a subject class,
612       and no object."
613     deprecated: false
614   Obligation:
615     type: string
616     enum:
617       - compulsory
618       - optional
619     deprecated: false
620   - Type:
621     const: Weight
622     description: >
623       "The weighted credit points. Most times identical to the credit points of an
624       element."
625     deprecated: false
626   Weight:
627     type: integer
628     minimum: 1
629     deprecated: false
630   - Type:
631     const: Time
632     description: >
633       "This attribute represents all time information on an element."
634     deprecated: false
635   Case:
636     description: >
637       "The case not only describes the kind of time that is measured,
638       but also the kind of element that is affected."
639     type: string
640     enum: # ? Have to ask Ronja, which was what.
641       - expenditure # Aufwand eines Moduls.
642       - duration # Zeitfenster fuer eine Thesis.
643       - presence # Anwesenheitszeit.
644       - frequency # Angebotshaeufigkeit fuer Veranstaltungen
645       - length # Laenge einer Klausur/einer Pruefung.
646     deprecated: false
647   Unit:
648     type: string
649     enum:
650       - min
651       - h
652       - weeks
653       - month
654       - sws # semester hours
655       - terms
656     deprecated: false
657   Value:
658     type: integer
659     minimum: 1
660     deprecated: false
661   Comment:
662     description: >
663       "Some time information need additional information, like frequency.
664       Those information can be put here."
665     type: string
666     minLength: 1
667     deprecated: false

```

```

667     - Type:
668         const: Repetition
669         description: >
670             "This attribute tells, how often an exam can be repeated before forced disenrollment.
671             The terminology is: 0 means no restriction, 1 means, the exam can be attended once."
672         deprecated: false
673     Repetition:
674         type: integer
675         minimum: 0
676         deprecated: false
677     _self:
678         title: "The address of an instance of this class."
679         $ref: /pointer
680         deprecated: false
681     if:
682         properties:
683             Type:
684                 const: Comment
685             required:
686                 - Type
687         then:
688             required:
689                 - Tail
690                 - _self
691     if:
692         properties:
693             Type:
694                 const: singleObligation
695             required:
696                 - Type
697         then:
698             required:
699                 - Obligation
700                 - _self
701     if:
702         properties:
703             Type:
704                 const: Weight
705             required:
706                 - Type
707         then:
708             required:
709                 - Weight
710                 - _self
711     if:
712         properties:
713             Type:
714                 const: Time
715             required:
716                 - Type
717         then:
718             required:
719                 - Case
720                 - Unit
721                 - Value
722                 - _self
723     if:
724         properties:
725             Type:
726                 const: Repetition
727             required:
728                 - Type
729         then:

```

---

*design process documentation  
of the data reference model*

```
792     # minItems : 1
793     # uniqueItems : true
794     # example :
795     # - Berufliche Orientierung
796     # - Fachliche Orientierung
797     # - Bildungswissenschaften
798     # deprecated : false
799 # TODO:
800 # Attributes have to reflect the relations between the classes.
801 # ----- #
802 # EOF
```

## H.2. Version 2 – the PlantUML representation



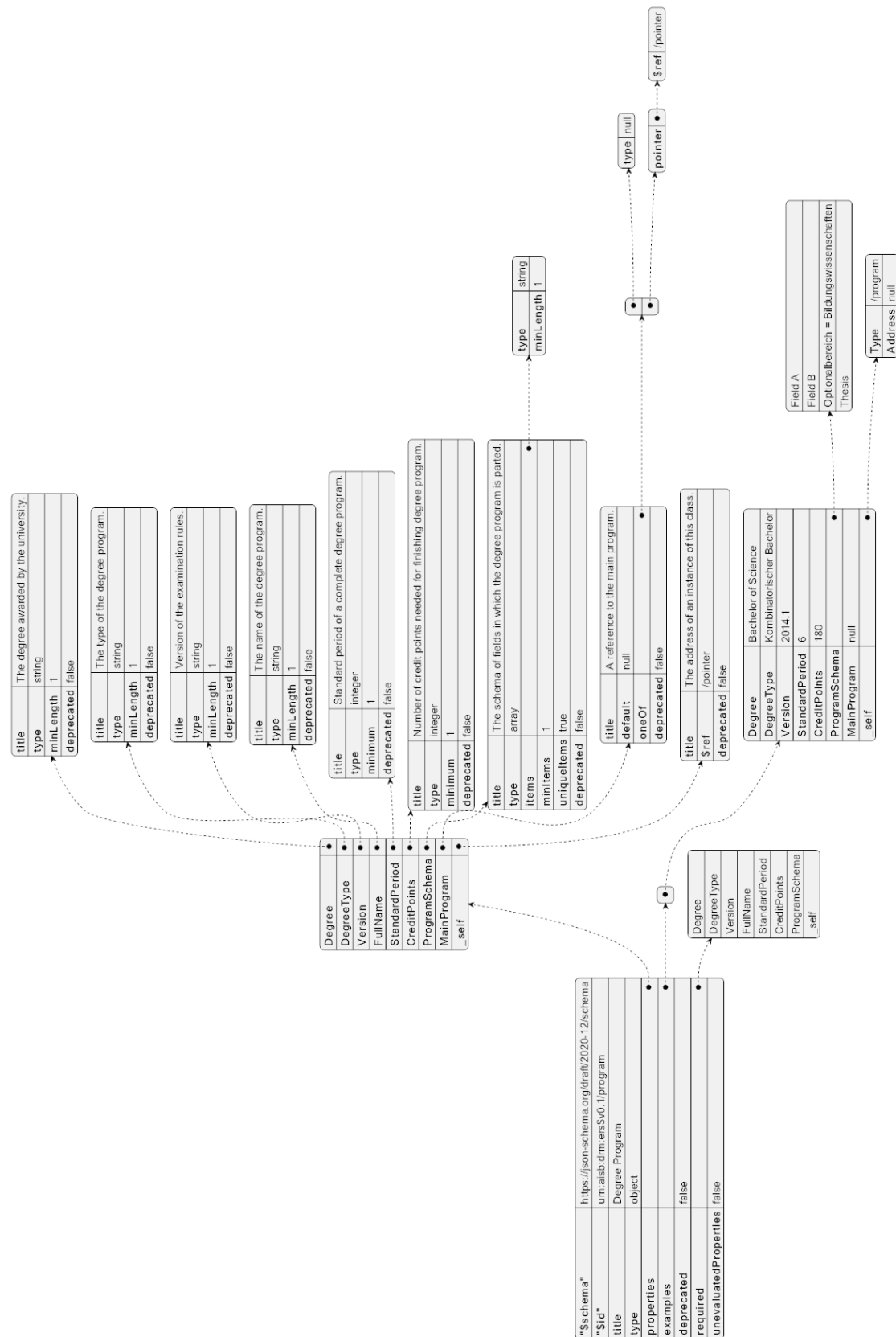


Figure 10.3.: the degree program class



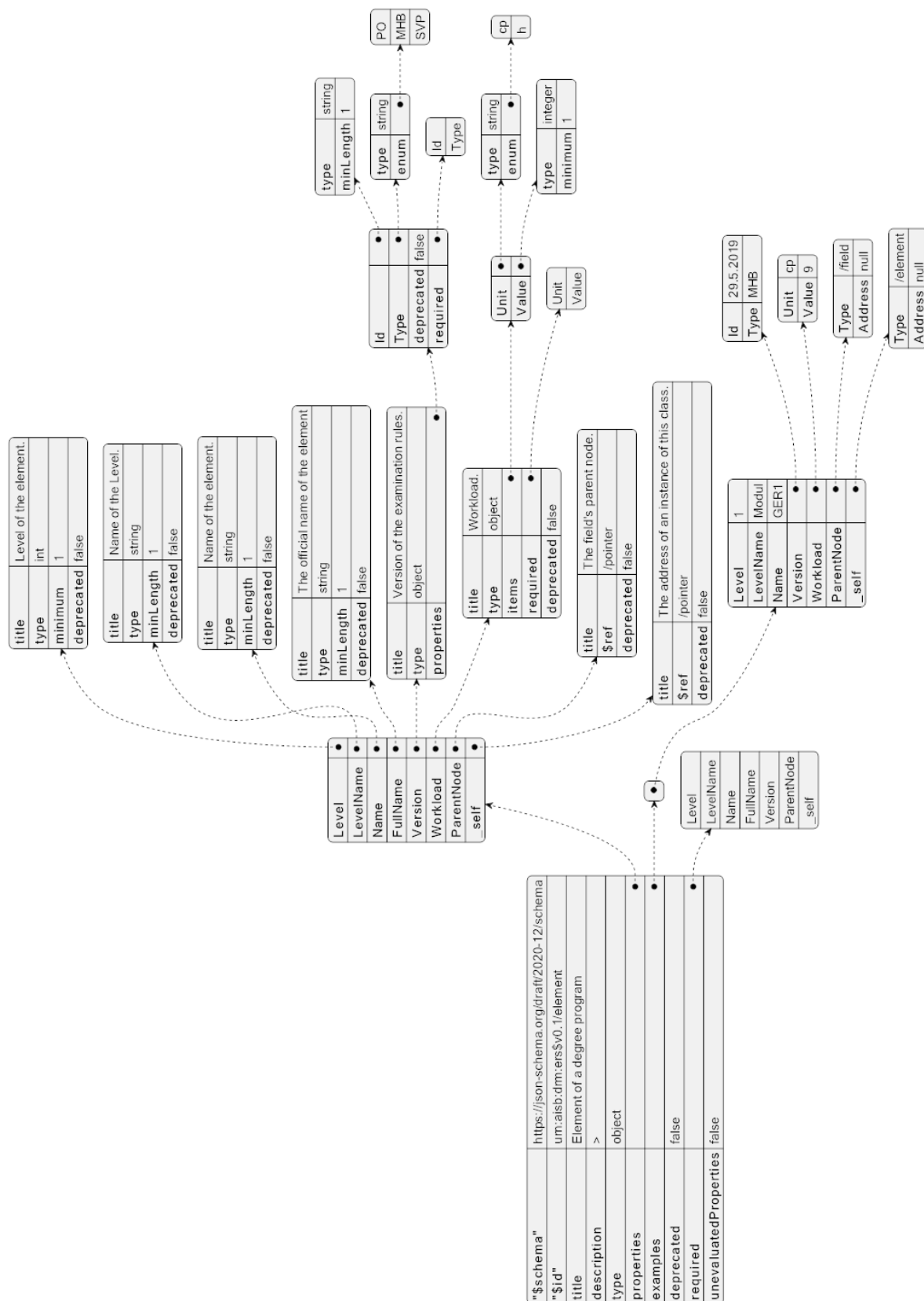


Figure 10.5.: the element class



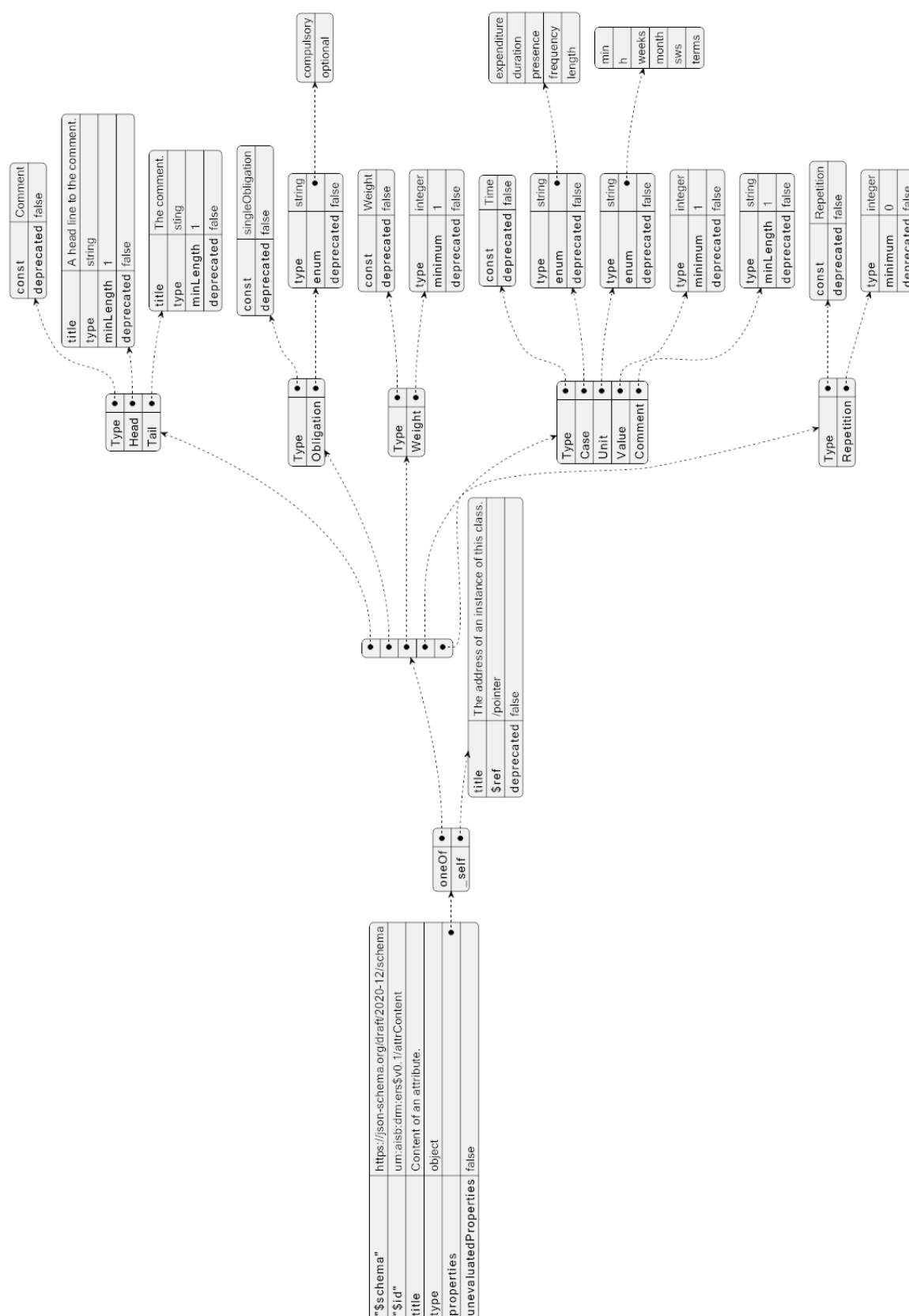


Figure 10.7.: the class representing the content of an attribute

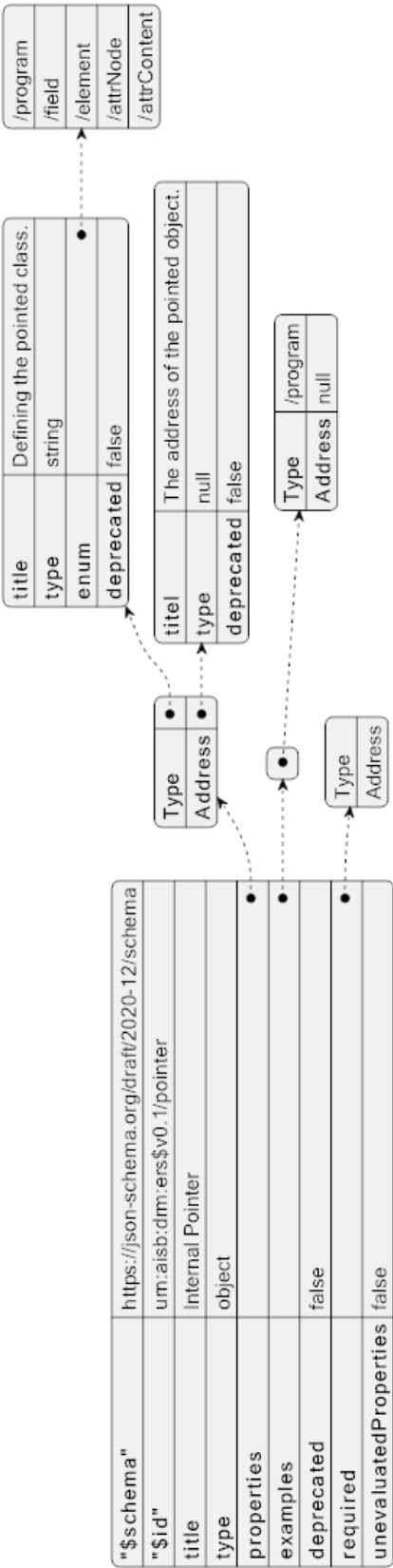


Figure 10.8.: the pointer class

## I. Data Reference Model 2.3.2

The following document presents the [data base reference model \(DRM\)](#) 2.3.2 by an [ER-diagram](#) and a description of the entities in detail.

**Data Reference Model 2.3.2**  
of the joint venture project *AIStudyBuddy*,  
RWTH Aachen, RU Bochum, BU Wuppertal

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Fuchs, JE (Ed.), Judel, S., Wagner, M. 2023. Data base model 2.3.2 of the joint venture project *AISTudyBuddy*. Technical report. Aachen, Bochum, Wuppertal: research project group ‘AISTudyBuddy’.

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CLS, RWTH Aachen University, Templergraben 55, 52062 Aachen, Germany”

Joint research project AISTudyBuddy  
RWTH Aachen | RU Bochum | BU Wuppertal  
Granted by the Federal Ministry of Education  
and Research  
Grant IDs:

16DHBKI016 (RWTH Aachen),  
16DHBKI017 (BU Wuppertal),  
16DHBKI018 (RU Bochum)

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*i5: Knowledge-based Systems Group*  
Prof. Dr. Wil van der Aalst  
*Chair of Process and Data Science*

Subproject governance at BU Wuppertal:

Prof. Dr. Kerstin Schneider  
*Wuppertal Research Institute for  
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### **Preface**

This report is based on the collaborative work on the Data Reference Model by the project members of the joint research project ‘AIStudyBuddy’ (see also the legal notice before). This group is that large and the contributed parts of each member varies that much, that we decided to mention only the authorship of the people directly responsible for this report, but please keep in mind that many more members were involved in the design process.

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## 1 Introduction

The *description* of the joint research project ‘AStudyBuddy’ proposes the creation of a common Data Reference Model (DRM; Burns et al., 1986; Carolla and Spitta, 2014; Palanivel and Chithralekha, 2018; Yang, 2020) to standardize the processing of data from custom information systems. The project description states the usage of data from campus management, learning management and examination systems, and the strategic goal of a standardized exchange of student data as a first step towards cross-university student monitoring.

The DRM should reflect the Student Life Cycle (SLC, i.e., the history of enrollments and achievements of a student; Bess, 1973; Gaaw et al., 2020) in a way, that universities can transform their own data into the model, independent from the campus management they use. Our design process was and still is conducted by the practical experiences made by the three partaking universities in extracting custom data and transforming it in according with the DRM. Additionally, further working groups of the project involved in analyzing and reporting data also postulated demands on the DRM.

The design process of the DRM is not completed yet, moreover the designing process of the DRM uses the *PDCA* (Plan-Do-Check-Act; Gidey et al., 2014; Sokovic, Pavletic, and Pipan, 2010) method. This means, the version *2.3.2* is a reliable basis for now and the future, but we also intend to further expand this basis – either to implement further data or to align better to the analyzing and reporting methods of the other working groups.

## 2 Model Description

The entities of the *DRM 2.3.2* are organized into three sets:

- the *personal data* of the student, that is independent of the attended university or the enrolled courses of studies,
- the *enrollment data* of a student at a general level and by term, i.e. the registration at a university and the enrollment in courses of studies (split into degree program and subjects), and
- the *achievement data*, e.g., visited courses and exam results.

Parallel to these sets, the data of the sets *personal data* and *enrollment data* is always divided into time-independent and time-dependent components, e.g., *enrollment* is time-independent and *enrollment\_term* depends on a university term (i.e., term-dependent). It follows a 1:*n* relation between a time-independent entity and its corresponding time-dependent entity. An exceptional case is *the achievement data*, that is divided into the two components *unit* and *unit\_event*. Both entities are time-dependent, but *unit* interrelates to a general date (e.g., the first date of a lecture course) and *unit\_event* always depends on a specific date or event (e.g., the day of an exam). This results into a 1:*n* relation between both entities as before.

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These sets of entities, as well as all entities, their attributes, and the relation between them are illustrated in Figure 1. The entities of the model are described in Table 1, while an in-depth description of all entities is done in section A.

*Remark 1 (course of studies).* It is common, speaking about the courses of studies of students, to refer to the attended degree and simultaneously to one or more major subjects. For analytic reasons, we had to divide this unity. Thereby, it is possible to differentiate between degree (e.g., Bachelor) and one or more major subjects (e.g., economics). Thus, the course of studies is represented by the two entities *degree\_program* and *subject* respectively their time-dependent analogs.

Table 1: List of entities.

| Entity                     | Description                                                                                                                         |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <i>person</i>              | Personal data of the student, e.g., gender or birth date.                                                                           |
| <i>personal_address</i>    | Anonymized addresses of the student.                                                                                                |
| <i>university</i>          | Information about a university, <sup>5</sup> i.e., id and name.                                                                     |
| <i>enrollment</i>          | Information about the enrollment of a student at <i>university</i> .                                                                |
| <i>enrollment_term</i>     | Term (generally semester) dependent information of <i>enrollment</i> .                                                              |
| <i>degree_program</i>      | The degree a student is aspiring at their course of studies, i.e., Bachelor of Arts or Master of Science.                           |
| <i>degree_program_term</i> | Term dependent information of <i>degree_program</i> .                                                                               |
| <i>subject</i>             | The subject(s) of the course of studies a student is enrolled in.                                                                   |
| <i>subject_term</i>        | Term dependent information of <i>subject</i> .                                                                                      |
| <i>unit</i>                | An arbitrary but well-defined element for measuring progress in a student's curriculum.                                             |
| <i>unit_event</i>          | Date dependent information of a <i>unit</i> , e.g., for an exam this could be registration, attendance, result, and revised result. |

Table 2: List of prefixes and suffixes.

| Affix        | Description                                                                                                  |
|--------------|--------------------------------------------------------------------------------------------------------------|
| <i>_date</i> | The suffix <i>_date</i> indicates that the attribute is not a counter but addresses a specific date or term. |

<sup>5</sup> This includes any higher educational institution.

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|                     |                                                                                                                           |
|---------------------|---------------------------------------------------------------------------------------------------------------------------|
| <code>_id</code>    | The suffix <code>_id</code> marks a primary or foreign key.                                                               |
| <code>is_</code>    | The prefix <code>is_</code> marks a boolean attribute.                                                                    |
| <code>_key</code>   | The suffix <code>_key</code> indicates that the attribute can only be interpreted together with a <code>key</code> table. |
| <code>_total</code> | The suffix <code>_total</code> indicates that the attribute is equal to the weighted sum of another attribute.            |

*Remark 2 (enrollment data).* Enrollment data is divided into *enrollment* (at a university), *degree\_program*, and *subject*. The average student is enrolled in two degree programs during their SLC: a bachelor and a master degree program. This results in an 1:n relation between *enrollment* and *degree\_program*. Furthermore, double major programs are as usual as single major programs at German universities. For example, double and and treble major subjects are a requirement to be qualified as a school teacher. This results in an 1:n relation between *degree\_program* and *subject*.

*Remark 3 (achievement data).* In our sense, achievement data is the data to measure the progress in a student's curriculum. Each unit represent a certain progress step, e.g., the participation in a course or the passing (or failing) of an exam. Some units are composed of other, e.g., modules based on components like lectures and exercises. Therefore, a unit can reference another unit, e.g., both lecture unit and exercise unit could reference the corresponding module unit. This results in a recursion of the unit entity.

*Remark 4 (unit and unit event).* Generally, a *unit* can be associated with several events, e.g., for an exam (the unit) these events could be registration, attendance, exam result, exam revision, etc. (the events of the unit). This makes the separation into two entities necessary: the *unit*, that will be associated to a general date, e.g., the first day of a term, and the time-dependent *unit\_event* associated to the date on which the event took place, e.g., the exam day.

*Remark 5 (null values).* The value 'null' should only be used for missing values. Each entity has default options if values are 'not existing', e.g., a value for the attribute 'invalidity' of a valid address (e.g., 9999-12 used for dates in the unspecified future).

*Remark 6 (several regulations).* In the best case, a student passes their course of studies according to the same version of examination regulations. However, frequently the degree program and the study subjects of a student's course of studies stay the same, but the version of their examination regulations changes. This is the reason, why the examination regulations are stored in the term-based entities. Another mechanism for handling changing examination regulations is the *is\_active* attribute of the entity *unit*. Units related to old examination regulations can be marked as inactive if necessary.

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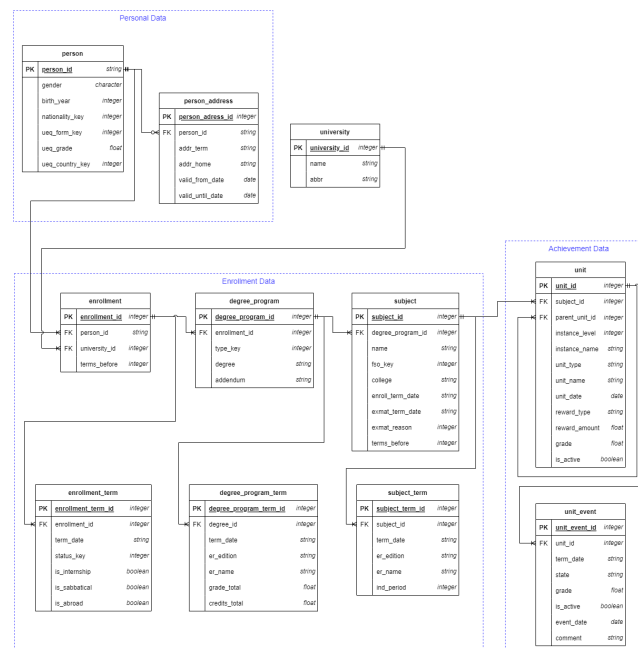


Fig. 1. ER-diagram of the DRM 2.3.2.

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## References

- Bess, James L. “Integrating faculty and student life cycles”. In: *Review of Educational Research* 43.4 (1973), pp. 377–403 (cit. on p. 4).
- Burns, Thomas et al. “Reference model for DBMS standardization”. In: *SIGMOD Record* 15.1 (1986), pp. 19–58 (cit. on p. 4).
- Carolla, Marco and Thorsten Spitta. “Methodological aspects of a data reference model for campus management systems”. In: (2014) (cit. on p. 4).
- Gaaw, Stephanie et al. “Student Life Cycle als inhärenter Bestandteil des Dresdner Modells für Qualitätsmanagement in Studium und Lehre”. In: *Philipp Pohlenz, Lukas Mitterauer und Susan Harris-Huermann (Hg.): Qualitätssicherung im Student Life Cycle. Münster, New York: Waxmann* (2020), pp. 171–180 (cit. on p. 4).
- Gidey, Ephrem et al. “The plan-do-check-act cycle of value addition”. In: *Industrial Engineering & Management* 3.124 (2014), pp. 2169–0316 (cit. on p. 4).
- Palanivel, K and T Chithralekha. “Big Data Reference Architecture for e-Learning Analytical Systems”. In: *Int. J. Recent Innov. Trends Comput. Commun* 6.1 (2018) (cit. on p. 4).
- Sokovic, Mirko, Dusko Pavletic, and K Kern Pipan. “Quality improvement methodologies – PDCA cycle, RADAR matrix, DMAIC and DFSS”. In: *Journal of achievements in materials and manufacturing engineering* 43.1 (2010), pp. 476–483 (cit. on p. 4).
- Yang, Yi. “Research on the Data Reference Model of NMIS”. In: *Artificial Intelligence and Security: 6th International Conference, ICAIS 2020, Hohhot, China, July 17–20, 2020, Proceedings, Part I* 6. Springer. 2020, pp. 419–426 (cit. on p. 4).

## Appendix

### A Entity specifications

The DRM is described by the entity relation diagram (see Figure 1) and the following entity description. The entities are described one by one. Every entity is described by several tables: one table for each entity (the ‘head table’) and one to two tables for each attribute.

The head table of each entity includes the entity name, the version number, and the last update to this entity. Complemented is the table by a short description of the entity. Each attribute of the entity is represented by one to two tables and an optional description. If the attribute contains an enumerated variable, the second table reflects the key table, i.e., the representation of each valid key and its meaning. Otherwise a second table is omitted. The first table contains basic information about the attribute explained in Table 3.

Table 3: The attribute describing values of the DRM 2.3.2

| Property | Value                                                                                                                                                                                                                               |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name     | The name of the attribute.                                                                                                                                                                                                          |
| Label    | The label of the attribute, i.e., a more human-readable attribute name.                                                                                                                                                             |
| PK       | True if the attribute represents the Primary Key (PK) of the entity. Otherwise omitted.                                                                                                                                             |
| FK       | The Foreign Key (FK) corresponding to the PK of another entity. We represent the foreign key by <code>&lt;entity name&gt;.&lt;attribute name&gt;</code> , e.g., <code>person.person_id</code> . Omitted, if the attribute is no FK. |
| Type     | The type of the attribute, i.e., boolean, integer, float, character, string, or date.                                                                                                                                               |
| Pattern  | A regular expression representing the valid values of the attribute.                                                                                                                                                                |
| Format   | An additional information about the format of the attribute, e.g., special date formats.                                                                                                                                            |

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## B person

*Description:* Dimension 'person' of the AIStudyBuddy data model. This are timeless information on a person.

Table 4: The entity 'person'.

| Property | Value  |
|----------|--------|
| Name     | person |
| Version  | 2.3.2  |

### B.1 person\_id

*Description:* An individual but unique id assigned by the universities/institutions to each person. The characters before '-' identify uniquely the university/institution. The numbers afterwards should not be identical to the registration number of a student to guarantee the anonymization of data.

Right now there is in use:

- BUW: Bergische Universitaet Wuppertal
- RUB: Ruhr-Universitaet Bochum
- RWTH: Rheinisch-Westfaelische Technische Hochschule Aachen

Table 5: The attribute 'person\_id'.

| Property  | Value                    |
|-----------|--------------------------|
| Name      | person_id                |
| Label     | Individual id of person. |
| PK        | True                     |
| Type      | string                   |
| Pattern   | "(BUW RUB RWTH)\-[0-9]+" |
| Unique id | ix0003                   |

### B.2 gender

*Description:* The gender of a person. The values are abbreviations for:

- m: male,
- f: female,
- d: diverse,
- -: no record



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Table 6: The attribute 'gender'.

| Property  | Value             |
|-----------|-------------------|
| Name      | gender            |
| Label     | Gender of person. |
| Type      | character         |
| Pattern   | "[mwd\~]"         |
| Unique id | ix0004            |

**B.3 birth\_year***Description:* Year of birth.

Table 7: The attribute 'birth\_year'.

| Property  | Value          |
|-----------|----------------|
| Name      | birth_year     |
| Label     | Year of birth. |
| Type      | integer        |
| Pattern   | "[0-9]{4}"     |
| Format    | yyyy           |
| Unique id | ix0068         |

**B.4 nationality\_key**

*Description:* The nationality of a person grouped in the three categories Germany, the EU with UK (without Germany) and Other.  
 If a person has two nationalities, than the priority of records is Germany, than EU, than Other.

Table 8: The attribute 'nationality\_key'.

| Property  | Value                |
|-----------|----------------------|
| Name      | nationality_key      |
| Label     | Grouped Nationality. |
| Type      | integer              |
| Pattern   | "[123]"              |
| Unique id | ix0069               |

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Table 9: The value key table of 'nationality\_key'.

| Key | Value         |
|-----|---------------|
| 1   | Germany       |
| 2   | EU and the UK |
| 3   | Other         |

### B.5 ueq\_form\_key

*Description:* The form of the university entrance qualification (ueq), i.e., the kind of certificate.

Table 10: The attribute 'ueq\_form\_key'.

| Property  | Value                                      |
|-----------|--------------------------------------------|
| Name      | ueq_form_key                               |
| Label     | Form of university entrance qualification. |
| Type      | integer                                    |
| Pattern   | "[0-9]+"                                   |
| Unique id | ix0007                                     |

Table 11: The value key table of 'ueq\_form\_key'.

| Key | Value                                            |
|-----|--------------------------------------------------|
| 1   | Beruflich Qualifizierte                          |
| 2   | Berufsfachschule                                 |
| 3   | Berufsoberschule                                 |
| 4   | Deutsche Schule im Ausland                       |
| 5   | Fachgymnasium                                    |
| 6   | Fachoberschule                                   |
| 7   | Gesamtschule                                     |
| 8   | Gymnasium                                        |
| 9   | Meister/innen und Gleichgestellte                |
| 10  | Schule im Ausland                                |
| 11  | Schule im Ausland [allg. Hochschulreife]         |
| 12  | Schule im Ausland [fachgebundene Hochschulreife] |
| 13  | Sonstige Studienberechtigung                     |
| 14  | Studienkolleg [allg. Hochschulreife]             |
| 15  | Studienkolleg [fachgebundene Hochschulreife]     |
| 16  | Abendgymnasium                                   |

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**B.6 ueq\_grade***Description:* Grade of university entrance qualification.

Table 12: The attribute 'ueq\_grade'.

| Property  | Value                                       |
|-----------|---------------------------------------------|
| Name      | ueq_grade                                   |
| Label     | Grade of university entrance qualification. |
| Type      | float                                       |
| Pattern   | "[1-4](\.[0-9])?"                           |
| Unique id | ix0010                                      |

**B.7 ueq\_country\_key***Description:* The country where the ueq was achieved. Again, this variable is grouped into three classes, namely Germany, the EU and UK as one group (without Germany), and Other.

Table 13: The attribute 'ueq\_country\_key'.

| Property  | Value                                                           |
|-----------|-----------------------------------------------------------------|
| Name      | ueq_country_key                                                 |
| Label     | Grouped Country awarding the university entrance qualification. |
| Type      | integer                                                         |
| Pattern   | "[123]"                                                         |
| Unique id | ix0070                                                          |

Table 14: The value key table of 'ueq\_country\_key'.

| Key | Value         |
|-----|---------------|
| 1   | Germany       |
| 2   | EU and the UK |
| 3   | Other         |

**C person\_address***Description:* Dimension 'person\_address' of the AIStudyBuddy data model. This time-dependent entity pursues the goal to get a picture of the mobility of students.

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Table 15: The entity 'person\_address'.

| Property | Value          |
|----------|----------------|
| Name     | person_address |
| Version  | 2.3.2          |

### C.1 person\_address\_id

*Description:* Id of each instance of address as sequential number.

Table 16: The attribute 'person\_address\_id'.

| Property  | Value             |
|-----------|-------------------|
| Name      | person_address_id |
| Label     | Id of address.    |
| PK        | True              |
| Type      | integer           |
| Pattern   | "[0-9]+"          |
| Unique id | v0203n002         |

### C.2 person\_id

*Description:* Every person\_address houses one and only one person. Every person lives at several person\_addresses (even though only at a term and a house address at once).

Table 17: The attribute 'person\_id'.

| Property  | Value            |
|-----------|------------------|
| Name      | person_id        |
| FK        | person.person_id |
| Unique id | ix0003           |

### C.3 addr\_term

*Description:* Most universities record two addresses of each student: where a student lives through term, and theirs registered address, e.g., theirs dormitory and theirs parental home. The former is meant by term address. The address is anonymized (see pattern).

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Table 18: The attribute 'addr\_term'.

| Property  | Value                                                   |
|-----------|---------------------------------------------------------|
| Name      | addr_term                                               |
| Label     | Region of term address.                                 |
| Type      | string                                                  |
| Pattern   | "[A-Z]{2}\-[:a1num:]{3}"                                |
| Format    | [Country indicator]-[First three digits of postal code] |
| Unique id | op0002                                                  |

**C.4 addr\_home**

*Description:* Most universities record two addresses of each student: where a student lives through term, and theirs registered address, e.g., theirs dormitory and theirs parental home. The latter is meant by home address. The address is anonymized (see pattern).

Table 19: The attribute 'addr\_home'.

| Property  | Value                                                   |
|-----------|---------------------------------------------------------|
| Name      | addr_home                                               |
| Label     | Region of home address.                                 |
| Type      | string                                                  |
| Pattern   | "[A-Z]{2}\-[:a1num:]{3}"                                |
| Format    | [Country indicator]-[First three digits of postal code] |
| Unique id | op0003                                                  |

**C.5 valid\_from\_date**

*Description:* The addresses are valid from this date on.

Table 20: The attribute 'valid\_from\_date'.

| Property  | Value                |
|-----------|----------------------|
| Name      | valid_from_date      |
| Label     | Date from validity.  |
| Type      | date                 |
| Pattern   | "[0-9]{4}\-[0-9]{2}" |
| Format    | yyyy-mm              |
| Unique id | v0203n004            |

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### C.6 valid\_until\_date

*Description:* The addresses are deprecated since this date. We use 9999-12, if addresses are still valid.

Table 21: The attribute 'valid\_until\_date'.

| Property  | Value                  |
|-----------|------------------------|
| Name      | valid_until_date       |
| Label     | Date since invalidity. |
| Type      | date                   |
| Pattern   | "[0-9]{4}\-[0-9]{2}"   |
| Format    | yyyy-mm                |
| Unique id | v0203n005              |

## D university

*Description:* Dimension 'university' of the AISTudyBuddy data model. We record the name of a university/institution and the identifiers used in the data model (currently only abbreviation).

Table 22: The entity 'university'.

| Property | Value      |
|----------|------------|
| Name     | university |
| Version  | 2.3.2      |

### D.1 university\_id

*Description:* Id of each instance of university\_id as sequential number.

Table 23: The attribute 'university\_id'.

| Property  | Value            |
|-----------|------------------|
| Name      | university_id    |
| Label     | Id of dimension. |
| PK        | True             |
| Type      | integer          |
| Pattern   | "[0-9]+"         |
| Unique id | v0203n007        |

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**D.2 abbr**

*Description:* The abbreviation of each university/institution is used to identify each university/institution, e.g., at person.person\_id.

Table 24: The attribute 'abbr'.

| Property  | Value                       |
|-----------|-----------------------------|
| Name      | abbr                        |
| Label     | Abbreviation of university. |
| Type      | string                      |
| Pattern   | "(BUW RUB RWTH)"            |
| Unique id | v0203n008                   |

**E enrollment**

*Description:* Dimension 'enrollment' of the AISTudyBuddy data model. The entity records the enrollment of a student at a university/institution.

Table 25: The entity 'enrollment'.

| Property | Value      |
|----------|------------|
| Name     | enrollment |
| Version  | 2.3.2      |

**E.1 enrollment\_id**

*Description:* Id of each instance of enrollment as sequential number.

Table 26: The attribute 'enrollment\_id'.

| Property  | Value            |
|-----------|------------------|
| Name      | enrollment_id    |
| Label     | Id of dimension. |
| PK        | True             |
| Type      | integer          |
| Pattern   | "[0-9]+"         |
| Unique id | v0203n010        |

**E.2 person\_id**

*Description:* Every person is registered to one or more universities, though is associated to one or more instances of enrollments. Each instance of enrollment

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is associated to one and only one person, because it is specific to person and university.

Table 27: The attribute 'person\_id'.

| Property  | Value            |
|-----------|------------------|
| Name      | person_id        |
| FK        | person.person_id |
| Unique id | ix0003           |

### E.3 university\_id

*Description:* Like mentioned in enrollment.person\_id, each instance of enrollment is associated to one and only one university.

Table 28: The attribute 'university\_id'.

| Property  | Value                    |
|-----------|--------------------------|
| Name      | university_id            |
| FK        | university.university_id |
| Unique id | v0203n007                |

### E.4 terms\_before

*Description:* The number of terms a student attended to other universities before registering at the current one. This differ from zero only if a student switches universities.

Table 29: The attribute 'terms\_before'.

| Property  | Value                              |
|-----------|------------------------------------|
| Name      | terms_before                       |
| Label     | Number of terms before enrollment. |
| PK        | True                               |
| Type      | integer                            |
| Pattern   | "[0-9]+"                           |
| Unique id | v0203n029                          |

## F enrollment\_term

*Description:* Dimension 'enrollment\_term' of the AISTudyBuddy data model. The entity records time-dependent, i.e., term-dependent information of an enrollment. At this point, we mean enrollment at a university. The registration to



DRM 2.3.2 19

a certain course of studies is split into attended degree and study subjects with entities of their's own.

Table 30: The entity 'enrollment\_term'.

| Property | Value           |
|----------|-----------------|
| Name     | enrollment_term |
| Version  | 2.3.2           |

### F.1 enrollment\_term\_id

*Description:* Id of each instance of enrollment\_term\_id as sequential number.

Table 31: The attribute 'enrollment\_term\_id'.

| Property  | Value              |
|-----------|--------------------|
| Name      | enrollment_term_id |
| Label     | Id of dimension.   |
| PK        | True               |
| Type      | integer            |
| Pattern   | "[0-9]+"           |
| Unique id | v0203n012          |

### F.2 enrollment\_id

*Description:* Since enrollment is the time-independent component of enrollment\_term, each instance of enrollment\_term is associated to one and only one instance of enrollment.

Table 32: The attribute 'enrollment\_id'.

| Property  | Value                    |
|-----------|--------------------------|
| Name      | enrollment_id            |
| FK        | enrollment.enrollment_id |
| Unique id | v0203n010                |

### F.3 term\_date

*Description:* The current term the information of enrollment\_term are related to.

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Table 33: The attribute 'term\_date'.

| Property  | Value             |
|-----------|-------------------|
| Name      | term_date         |
| Label     | Current term.     |
| Type      | string            |
| Pattern   | "[0-9]{4}(SS WS)" |
| Format    | yyyy(SS WS)       |
| Unique id | op0001            |

#### F.4 status\_key

*Description:* The status of a student's enrollment.

Table 34: The attribute 'status\_key'.

| Property  | Value              |
|-----------|--------------------|
| Name      | status_key         |
| Label     | Status of student. |
| Type      | integer            |
| Pattern   | "[1-5]"            |
| Unique id | ix0024             |

Table 35: The value key table of 'status\_key'.

| Key | Value          |
|-----|----------------|
| 1   | Haupt Hörer*in |
| 2   | Zweit Hörer*in |
| 3   | Studienkolleg  |
| 4   | Gast Hörer*in  |
| 5   | Promovend*in   |

#### F.5 is\_internship

*Description:* Flag of internship term.

Table 36: The attribute 'is\_internship'.

| Property | Value                    |
|----------|--------------------------|
| Name     | is_internship            |
| Label    | Flag of internship term. |

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|           |           |
|-----------|-----------|
| Type      | boolean   |
| Unique id | v0203n015 |

**F.6 is\_sabbatical***Description:* Flag of sabbatical term.

Table 37: The attribute 'is\_sabbatical'.

| Property  | Value                    |
|-----------|--------------------------|
| Name      | is_sabbatical            |
| Label     | Flag of sabbatical term. |
| Type      | boolean                  |
| Unique id | v0203n016                |

**F.7 is\_abroad***Description:* Flag of abroad term.

Table 38: The attribute 'is\_abroad'.

| Property  | Value                |
|-----------|----------------------|
| Name      | is_abroad            |
| Label     | Flag of abroad term. |
| Type      | boolean              |
| Unique id | v0203n017            |

**G degree\_program**

*Description:* Dimension 'degree\_program' of the AIStudyBuddy data model. We distinguish a course of studies into the degree, e.g., Bachelor of Arts, and its subjects, e.g., German and American studies.

Table 39: The entity 'degree\_program'.

| Property | Value          |
|----------|----------------|
| Name     | degree_program |
| Version  | 2.3.2          |

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### G.1 degree\_program\_id

*Description:* Id of each instance of degree\_program as sequential number.

Table 40: The attribute 'degree\_program\_id'.

| Property  | Value             |
|-----------|-------------------|
| Name      | degree_program_id |
| Label     | Id of dimension.  |
| PK        | True              |
| Type      | integer           |
| Pattern   | "[0-9]+"          |
| Unique id | v0203n018         |

### G.2 enrollment\_id

*Description:* Every attended course of studies requires the enrollment at a university/institution.

Table 41: The attribute 'enrollment\_id'.

| Property  | Value                    |
|-----------|--------------------------|
| Name      | enrollment_id            |
| FK        | enrollment.enrollment_id |
| Unique id | v0203n010                |

### G.3 type

*Description:* Type of the study program a student is participating.

Table 42: The attribute 'type'.

| Property  | Value                  |
|-----------|------------------------|
| Name      | type                   |
| Label     | Type of study program. |
| Type      | integer                |
| Pattern   | "[1-6]"                |
| Unique id | sp0003                 |

Table 43: The value key table of 'type'.

| Key | Value                      |
|-----|----------------------------|
| 1   | Erststudium                |
| 2   | Konsekutives Masterstudium |
| 3   | Zweitstudium               |
| 4   | Aufbaustudium              |
| 5   | Promotionsstudium          |
| 6   | Andere                     |

G.4 degree

Description: This is the degree that will be awarded to the student after successfully finishing the course of studies.

Table 44: The attribute 'degree'.

| Property  | Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name      | degree                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Label     | Degree of the study program.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Type      | string                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Pattern   | <pre>""(kombinatorischer)? (Bachelor Master) of (   Arts          ( \\(B\\\.A\\\.\\)   \\(M\\\.A\\\.\\) )     Science       ( \\(B\\\.Sc\\\.\\)   \\(M\\\.Sc\\\.\\) )     Engineering    ( \\(B\\\.Eng\\\.\\)   \\(M\\\.Eng\\\.\\) )     Laws          ( \\(LL\\\.B\\\.\\)   \\(LL\\\.M\\\.\\) )     Music         ( \\(B\\\.Mus\\\.\\)   \\(M\\\.Mus\\\.\\) )     Musical Arts   ( \\(B\\\.M\\\.A\\\.\\)   \\(M\\\.M\\\.A\\\.\\) )     Fine Arts      ( \\(B\\\.F\\\.A\\\.\\)   \\(M\\\.F\\\.A\\\.\\) )     Education     ( \\(B\\\.Ed\\\.\\)   \\(M\\\.Ed\\\.\\) )     Business Administration ( \\(BBA\\)   \\(MBA\\) ) )"</pre> |
| Unique id | sp0007                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

G.5 addendum

Description: Some degree programs have an addendum to distinguish between several forms like the addendum 'Lehramt fuer Gymnasium/Gesamtschule'.

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Table 45: The attribute 'addendum'.

| Property  | Value                   |
|-----------|-------------------------|
| Name      | addendum                |
| Label     | Addendum to the degree. |
| Type      | string                  |
| Pattern   | ". "                    |
| Unique id | v0203n030               |

## H degree\_program\_term

*Description:* Dimension 'degree\_program\_term' of the AIStudyBuddy data model. The entity records time-dependent, i.e., term-dependent information of the degree related information.

Table 46: The entity 'degree\_program\_term'.

| Property | Value               |
|----------|---------------------|
| Name     | degree_program_term |
| Version  | 2.3.2               |

### H.1 degree\_program\_term\_id

*Description:* Id of each instance of degree\_term as sequential number.

Table 47: The attribute 'degree\_program\_term\_id'.

| Property  | Value                  |
|-----------|------------------------|
| Name      | degree_program_term_id |
| Label     | Id of dimension.       |
| PK        | True                   |
| Type      | integer                |
| Pattern   | "[0-9]+"               |
| Unique id | v0203n019              |

### H.2 degree\_id

*Description:* Since degree\_program is the time-independent component of degree\_program\_term, each instance of degree\_program\_term is associated to one and only one instance of degree\_program.

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Table 48: The attribute 'degree\_id'.

| Property  | Value                            |
|-----------|----------------------------------|
| Name      | degree_id                        |
| FK        | degree_program.degree_program_id |
| Unique id | v0203n018                        |

**H.3 term\_date**

*Description:* The term the information of this dimension are related to.

Table 49: The attribute 'term\_date'.

| Property  | Value             |
|-----------|-------------------|
| Name      | term_date         |
| Label     | The current term. |
| Type      | string            |
| Pattern   | "[0-9]{4}(SS WS)" |
| Format    | yyyy(SS WS)       |
| Unique id | op0004            |

**H.4 er\_edition**

*Description:* An identifier of the edition of a degree program/examination regulations (er).

Table 50: The attribute 'er\_edition'.

| Property  | Value                                                  |
|-----------|--------------------------------------------------------|
| Name      | er_edition                                             |
| Label     | Edition of the degree program/examination regulations. |
| Type      | string                                                 |
| Pattern   | ". "                                                   |
| Unique id | op0006                                                 |

**H.5 er\_name**

*Description:* Exact name of the degree program/examination regulations.

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Table 51: The attribute 'er\_name'.

| Property  | Value                                                     |
|-----------|-----------------------------------------------------------|
| Name      | er_name                                                   |
| Label     | Exact name of the degree program/examination regulations. |
| Type      | string/text                                               |
| Pattern   | ". "                                                      |
| Unique id | op0005                                                    |

#### H.6 grade\_total

*Description:* The overall grade of a student by term, as and if the student management system records this information.

Table 52: The attribute 'grade\_total'.

| Property  | Value                               |
|-----------|-------------------------------------|
| Name      | grade_total                         |
| Label     | Current grade of the study program. |
| Type      | float                               |
| Pattern   | "[0-5](\.[0-9])?"                   |
| Unique id | sp0014                              |

#### H.7 credits\_total

*Description:* The overall credits of a student by term, as and if the student management system records this information.

Table 53: The attribute 'credits\_total'.

| Property  | Value                         |
|-----------|-------------------------------|
| Name      | credits_total                 |
| Label     | Credits of the study program. |
| Type      | integer                       |
| Pattern   | "(\-1 [0-9]+)"                |
| Unique id | sp0015                        |

### I subject

*Description:* Dimension 'subject' of the AIStudyBuddy data model. We distinguish a course of studies into the degree, e.g., Bachelor of Arts, and its subjects,



DRM 2.3.2 27

e.g., German and American studies. Study subjects and attended degrees have to be splitted because of double majors and other issues.

Table 54: The entity 'subject'.

| Property | Value   |
|----------|---------|
| Name     | subject |
| Version  | 2.3.2   |

### I.1 subject\_id

*Description:* Id of each instance of subject\_id as sequential number.

Table 55: The attribute 'subject\_id'.

| Property  | Value            |
|-----------|------------------|
| Name      | subject_id       |
| Label     | Id of dimension. |
| PK        | True             |
| Pattern   | "[0-9]+"         |
| Unique id | v0203n022        |

### I.2 degree\_program\_id

*Description:* Every study subject needs a course of study and therefore an attended degree.

Table 56: The attribute 'degree\_program\_id'.

| Property  | Value                            |
|-----------|----------------------------------|
| Name      | degree_program_id                |
| FK        | degree_program.degree_program_id |
| Unique id | v0203n018                        |

### I.3 name

*Description:* The name of the subject of the study program as the university assigned it to the study program.

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Table 57: The attribute 'name'.

| Property  | Value                         |
|-----------|-------------------------------|
| Name      | name                          |
| Label     | Subject of the study program. |
| Type      | string                        |
| Pattern   | ".*"                          |
| Unique id | sp0008                        |

#### I.4 fso\_key

*Description:* For comparison the identifier of the Federal Statistical Office (FSO) of Germany is stored. Source of enumeration: Fachserie 11 Reihe 4.1 Sommersemester 2022, 02.02.2022, Statistisches Bundesamt (Destatis).

Table 58: The attribute 'fso\_key'.

| Property  | Value                                    |
|-----------|------------------------------------------|
| Name      | fso_key                                  |
| Label     | Official key (FSO) of the study subject. |
| Type      | integer                                  |
| Pattern   | "[0-9]+"                                 |
| Unique id | v0203n031                                |

Table 59: The value key table of 'fso\_key'.

| Key | Value                                                          |
|-----|----------------------------------------------------------------|
| 1   | Ägyptologie                                                    |
| 2   | Afrikanistik                                                   |
| 3   | Agrarwissenschaft/Landwirtschaft                               |
| 4   | Interdisziplinäre Studien (Schwerpunkt Geisteswissenschaften)) |
| 5   | Klassische Philologie                                          |
| 6   | Amerikanistik/Amerikakunde                                     |
| 7   | Angewandte Kunst                                               |
| 8   | Anglistik/Englisch                                             |
| 9   | Anthropologie (Humanbiologie)                                  |
| 10  | Arabisch/Arabistik                                             |
| 11  | Arbeitslehre/Wirtschaftslehre                                  |
| 12  | Archäologie                                                    |
| 13  | Architektur                                                    |
| 14  | Astrophysik und Astronomie                                     |

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|    |                                                                                           |
|----|-------------------------------------------------------------------------------------------|
| 15 | Außereuropäische Sprachen und Kulturen in Ozeanien und Amerika                            |
| 16 | Baltistik                                                                                 |
| 17 | Bauingenieurwesen/Ingenieurbau                                                            |
| 18 | Berufsbezogene Fremdsprachenausbildung                                                    |
| 20 | Bergbau/Bergtechnik                                                                       |
| 21 | Betriebswirtschaftslehre                                                                  |
| 22 | Informations- und Bibliothekswissenschaften (nicht für Verwaltungsfachhochschulen)        |
| 23 | Bildende Kunst/Graphik                                                                    |
| 24 | Europäische Ethnologie und Kulturwissenschaft                                             |
| 25 | Biochemie                                                                                 |
| 26 | Biologie                                                                                  |
| 28 | Brauwesen/Getränketechnologie                                                             |
| 29 | Sportwissenschaft                                                                         |
| 30 | Interdisziplinäre Studien (Schwerpunkt Rechts-, Wirtschafts- und Sozialwissenschaften) 1) |
| 31 | Byzantinistik                                                                             |
| 32 | Chemie                                                                                    |
| 33 | Chemie-Ingenieurwesen/ Chemieverfahrenstechnik                                            |
| 34 | Dänisch                                                                                   |
| 35 | Darstellende Kunst/Bühnenkunst/Regie                                                      |
| 36 | Sonstige Regionalwissenschaften                                                           |
| 37 | Archiv- und Dokumentationswissenschaft                                                    |
| 38 | Lateinamerika-Studien                                                                     |
| 39 | Geowissenschaften allgemein                                                               |
| 40 | Interdisziplinäre Studien (Schwerpunkt Kunst, Kunstwissenschaft)                          |
| 42 | Wirtschaftsrecht                                                                          |
| 43 | Neugriechisch                                                                             |
| 44 | Ost- und Südosteuropa-Studien                                                             |
| 48 | Elektrotechnik/Elektronik                                                                 |
| 49 | Interdisziplinäre Studien (Schwerpunkt Naturwissenschaften)                               |
| 50 | Geographie/Erdkunde                                                                       |
| 52 | Erziehungswissenschaft (Pädagogik)                                                        |
| 53 | Evang. Theologie, -Religionslehre                                                         |
| 54 | Film und Fernsehen                                                                        |
| 56 | Finno-Ugristik                                                                            |
| 57 | Luft- und Raumfahrttechnik                                                                |
| 58 | Forstwissenschaft, -wirtschaft                                                            |
| 59 | Französisch                                                                               |
| 60 | Gartenbau                                                                                 |
| 61 | Meliorationswesen                                                                         |
| 64 | Naturschutz                                                                               |

|     |                                                                 |
|-----|-----------------------------------------------------------------|
| 30  | Fuchs, Judel and Wagner                                         |
| 65  | Geologie/Paläontologie                                          |
| 66  | Geophysik                                                       |
| 67  | Germanistik/Deutsch                                             |
| 68  | Geschichte                                                      |
| 69  | Graphikdesign/Kommunikationsgestaltung                          |
| 70  | Griechisch                                                      |
| 71  | Haushalts- und Ernährungswissenschaft                           |
| 72  | Interdisziplinäre Studien (Schwerpunkt Ingenieurwissenschaften) |
| 73  | Hebräisch/Judaistik                                             |
| 74  | Transport-/Fördertechnik                                        |
| 75  | Holzwirtschaft                                                  |
| 76  | Hütten- und Gießereiwesen                                       |
| 77  | Wasserwirtschaft                                                |
| 78  | Indologie                                                       |
| 79  | Informatik                                                      |
| 80  | Instrumentalmusik                                               |
| 81  | Iranistik                                                       |
| 82  | Holz-/Fasertechnik                                              |
| 83  | Islamwissenschaft                                               |
| 84  | Italienisch                                                     |
| 85  | Japanologie                                                     |
| 86  | Kath. Theologie, -Religionslehre                                |
| 88  | Optoelektronik                                                  |
| 89  | Verkehrsingenieurwesen                                          |
| 90  | Lernbereich Geisteswissenschaften                               |
| 91  | Kunsterziehung                                                  |
| 92  | Kunstgeschichte, Kunstwissenschaft                              |
| 93  | Landespflege/Landschaftsgestaltung                              |
| 94  | Wasserbau                                                       |
| 95  | Latein                                                          |
| 96  | Lebensmittelchemie                                              |
| 97  | Lebensmitteltechnologie                                         |
| 98  | Sportpädagogik/Sportpsychologie                                 |
| 101 | Restaurierungskunde                                             |
| 102 | Schauspiel                                                      |
| 103 | Markscheidewesen                                                |
| 104 | Maschinenbau/-wesen                                             |
| 105 | Mathematik                                                      |
| 106 | Tanzpädagogik                                                   |
| 107 | Medizin (Allgemein-Medizin)                                     |
| 108 | Metalltechnik                                                   |
| 110 | Meteorologie                                                    |
| 111 | Mineralogie                                                     |
| 113 | Musikerziehung                                                  |

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|     |                                                                        |
|-----|------------------------------------------------------------------------|
| 114 | Musikwissenschaft/-geschichte                                          |
| 115 | Grundschul-/Primarstufenpädagogik                                      |
| 116 | Textilgestaltung                                                       |
| 117 | Ausländerpädagogik                                                     |
| 118 | Technomathematik                                                       |
| 119 | Niederländisch                                                         |
| 120 | Nordistik/Skandinavistik (Nordische Philologie, Einzelsprachen a.n.g.) |
| 121 | Medieninformatik                                                       |
| 122 | Orientalistik/Altorientalistik                                         |
| 123 | Ingenieurinformatik/Technische Informatik                              |
| 124 | Ozeanographie                                                          |
| 125 | Agrarökonomie                                                          |
| 126 | Pharmazie                                                              |
| 127 | Philosophie                                                            |
| 128 | Physik                                                                 |
| 129 | Politikwissenschaft/Politologie                                        |
| 130 | Westslawisch (allgemein und a.n.g.)                                    |
| 131 | Portugiesisch                                                          |
| 132 | Psychologie                                                            |
| 134 | Raumplanung                                                            |
| 135 | Rechtswissenschaft                                                     |
| 136 | Religionswissenschaft                                                  |
| 137 | Romanistik (Roman. Philologie, Einzelsprachen a.n.g.)                  |
| 138 | Agrarbiologie                                                          |
| 139 | Russisch                                                               |
| 140 | Angewandte Systemwissenschaften                                        |
| 141 | Abfallwirtschaft                                                       |
| 142 | Schiffbau/Schiffstechnik                                               |
| 143 | Augenoptik                                                             |
| 144 | Technische Kybernetik                                                  |
| 145 | Sinologie/Koreanistik                                                  |
| 146 | Slawistik (Slaw. Philologie)                                           |
| 147 | Sozialkunde                                                            |
| 148 | Sozialwissenschaften                                                   |
| 149 | Soziologie                                                             |
| 150 | Spanisch                                                               |
| 152 | Allgemeine Sprachwissenschaft/ Indogermanistik                         |
| 153 | Südslawisch (Bulgarisch, Serbokroatisch, Slowenisch usw.)              |
| 154 | Lernbereich Gesellschaftslehre                                         |
| 155 | Theaterwissenschaft                                                    |
| 156 | Tiermedizin/Veterinärmedizin                                           |
| 157 | Mikroelektronik                                                        |
| 158 | Turkologie                                                             |

|     |                                                            |
|-----|------------------------------------------------------------|
| 32  | Fuchs, Judel and Wagner                                    |
| 159 | Edelstein- und Schmuckdesign                               |
| 160 | Computerlinguistik                                         |
| 161 | Diakoniewissenschaft                                       |
| 162 | Caritaswissenschaft                                        |
| 163 | Rhythmik                                                   |
| 164 | Jazz und Populärmusik                                      |
| 165 | Orchestermusik                                             |
| 166 | Sportmanagement/Sportökonomie                              |
| 167 | Europäische Wirtschaft                                     |
| 168 | Justizvollzug                                              |
| 169 | Ethik                                                      |
| 171 | Vermessungswesen (Geodäsie)                                |
| 172 | Verwaltungswissenschaft/-wesen                             |
| 173 | Ethnologie                                                 |
| 174 | Volkskunde                                                 |
| 175 | Volkswirtschaftslehre                                      |
| 176 | Werkerziehung                                              |
| 177 | Werkstofftechnik                                           |
| 178 | Wirtschafts-/Sozialgeographie                              |
| 179 | Wirtschaftsingenieurwesen mit wirtschaftswiss. Schwerpunkt |
| 180 | Kaukasistik                                                |
| 181 | Wirtschaftspädagogik                                       |
| 182 | Internationale Betriebswirtschaft/ Management              |
| 183 | Wirtschafts-/Sozialgeschichte                              |
| 184 | Wirtschaftswissenschaften                                  |
| 185 | Zahnmedizin                                                |
| 186 | Lernbereich Naturwissenschaften/ Sachunterricht            |
| 187 | Asiatische Sprachen und Kulturen/Asienwissenschaften       |
| 188 | Allgemeine Literaturwissenschaft                           |
| 189 | Niederdeutsch                                              |
| 190 | Sonderpädagogik                                            |
| 191 | Komposition                                                |
| 192 | Dirigieren                                                 |
| 193 | Kirchenmusik                                               |
| 194 | Tonmeister                                                 |
| 195 | Gesundheitspädagogik                                       |
| 196 | Studienkolleg                                              |
| 197 | Holzbau                                                    |
| 199 | Lernbereich Technik                                        |
| 200 | Computer- und Kommunikationstechniken                      |
| 201 | Werken (technisch)/Technologie                             |
| 202 | Fertigungs-/Produktionstechnik                             |
| 203 | Industriedesign/Produktgestaltung                          |
| 204 | Malerei                                                    |

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|     |                                                     |
|-----|-----------------------------------------------------|
| 205 | Bildhauerei/Plastik                                 |
| 206 | Polnisch                                            |
| 207 | Sorabistik                                          |
| 208 | Soziale Arbeit                                      |
| 209 | Tschechisch                                         |
| 210 | Verkehrswirtschaft                                  |
| 211 | Energieverfahrenstechnik                            |
| 212 | Feinwerktechnik                                     |
| 213 | Versorgungstechnik                                  |
| 215 | Gesundheitstechnik                                  |
| 216 | Glastechnik/Keramik                                 |
| 219 | Kunststofftechnik                                   |
| 220 | Milch- und Molkereiwirtschaft                       |
| 221 | Bioinformatik                                       |
| 222 | Kommunikations- und Informationstechnik             |
| 223 | Nautik/Seefahrt                                     |
| 224 | Physikalische Technik/Mechanische Verfahrenstechnik |
| 225 | Textil- und Bekleidungstechnik/-gewerbe             |
| 226 | Verfahrenstechnik                                   |
| 227 | Weinbau und Kellerwirtschaft                        |
| 230 | Gesang                                              |
| 231 | Druck- und Reproduktionstechnik                     |
| 232 | Gesundheitswissenschaften/ -management              |
| 233 | Nichtärztliche Heilberufe/Therapien                 |
| 234 | Pflegewissenschaft/ -management                     |
| 235 | Fahrzeugtechnik                                     |
| 242 | Innenarchitektur                                    |
| 245 | Sozialpädagogik                                     |
| 247 | Medizinische Informatik                             |
| 253 | Sozialwesen                                         |
| 254 | Sachunterricht (einschl. Schulgarten)               |
| 255 | Archivwesen                                         |
| 256 | Rechtspflege                                        |
| 257 | Arbeits- und Berufsberatung                         |
| 258 | Arbeitsverwaltung                                   |
| 259 | Auswärtige Angelegenheiten                          |
| 260 | Bundeswehrverwaltung                                |
| 261 | Innere Verwaltung                                   |
| 262 | Bibliothekswesen                                    |
| 263 | Polizei/Verfassungsschutz                           |
| 264 | Sozialversicherung                                  |
| 265 | Bankwesen                                           |
| 266 | Finanzverwaltung                                    |
| 268 | Verkehrswesen                                       |
| 269 | Zoll- und Steuerverwaltung                          |

|     |                                                          |
|-----|----------------------------------------------------------|
| 34  | Fuchs, Judel and Wagner                                  |
| 270 | Berufs- und Wirtschaftspädagogik                         |
| 271 | Deutsch als Fremdsprache oder als Zweitsprache           |
| 272 | Alte Geschichte                                          |
| 273 | Mittlere und neuere Geschichte                           |
| 274 | Tourismuswirtschaft                                      |
| 275 | Wissenschaftsgeschichte/ Technikgeschichte               |
| 276 | Wirtschaftsmathematik                                    |
| 277 | Wirtschaftsinformatik                                    |
| 280 | Kartographie                                             |
| 282 | Biotechnologie                                           |
| 283 | Landschaftsökologie/Biogeographie                        |
| 284 | Angewandte Sprachwissenschaft                            |
| 286 | Mikrosystemtechnik                                       |
| 287 | Neue Medien                                              |
| 290 | Sonstige Fächer                                          |
| 292 | Islamische Studien/Islamische Theologie                  |
| 294 | Materialwissenschaft                                     |
| 300 | Biomedizin                                               |
| 302 | Medienwissenschaft                                       |
| 303 | Kommunikationswissenschaft/Publizistik                   |
| 304 | Medienwirtschaft/Medienmanagement                        |
| 305 | Medientechnik                                            |
| 310 | Regenerative Energien                                    |
| 312 | Statistik                                                |
| 316 | Elektrische Energietechnik                               |
| 320 | Ernährungswissenschaft                                   |
| 321 | Erwachsenenbildung und außerschulische Jugendbildung     |
| 333 | Haushaltswissenschaft                                    |
| 353 | Pflanzenproduktion                                       |
| 361 | Schulpädagogik                                           |
| 365 | Pädagogik der frühen Kindheit                            |
| 370 | Wirtschaftsingenieurwesen mit ingenieurwiss. Schwerpunkt |
| 371 | Tierproduktion                                           |
| 380 | Mechatronik                                              |
| 385 | Geoökologie                                              |
| 390 | Archäometrie (Ingenieurarchäologie)                      |
| 429 | Stahlbau                                                 |
| 457 | Umwelttechnik (einschl. Recycling)                       |
| 458 | Umweltschutz                                             |
| 464 | Facility Management                                      |
| 544 | Evang. Religionspädagogik, kirchliche Bildungsarbeit     |
| 545 | Kath. Religionspädagogik, kirchliche Bildungsarbeit      |
| 548 | Ur- und Frühgeschichte                                   |



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**I.5 college**

*Description:* The college/department/school/etc. a subject is assigned to by the respective university.

Table 60: The attribute 'college'.

| Property  | Value                         |
|-----------|-------------------------------|
| Name      | college                       |
| Label     | College of the subject field. |
| Type      | string                        |
| Pattern   | ".*"                          |
| Unique id | sp0039                        |

**I.6 enroll\_term\_date**

*Description:* The term the student registered the first time to this specific university/degree/subject combination.

Table 61: The attribute 'enroll\_term\_date'.

| Property  | Value               |
|-----------|---------------------|
| Name      | enroll_term_date    |
| Label     | Term of enrollment. |
| Type      | string              |
| Pattern   | "([0-9]{4})(SS WS)" |
| Format    | yyyy(SS WS)         |
| Unique id | ix0071              |

**I.7 exmat\_term\_date**

*Description:* The term the student exmatriculated from the specific university/degree/subject combination.

Table 62: The attribute 'exmat\_term\_date'.

| Property  | Value                    |
|-----------|--------------------------|
| Name      | exmat_term_date          |
| Label     | Term of exmatriculation. |
| Type      | string                   |
| Pattern   | "([0-9]{4})(SS WS)"      |
| Format    | yyyy(SS WS)              |
| Unique id | ix0072                   |

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### I.8 exmat\_reason\_key

*Description:* The reason why a student exmatriculated from the specific degree/subject combination. Important here are:

- switching subjects of double major degree programs,
- switching degree programs,
- switching institutions,
- exmatriculation because of finishing a degree program,
- exmatriculation because failing an exam too often,
- other reasons.

Table 63: The attribute 'exmat\_reason\_key'.

| Property  | Value                     |
|-----------|---------------------------|
| Name      | exmat_reason_key          |
| Label     | Reason of exmatriculation |
| Type      | integer                   |
| Pattern   | " [0-9] +"                |
| Unique id | ix0073                    |

Table 64: The value key table of 'exmat\_reason\_key'.

| Key | Value                                                   |
|-----|---------------------------------------------------------|
| 0   | Not exmatriculated.                                     |
| 1   | Exmatrikulation aufgrund landesrechtl.Bestimmungen      |
| 2   | Beendigung des Studiums nach bestandener Prüfung        |
| 3   | Unterbrechung des Studiums                              |
| 4   | Beendigung des Studiums ohne Prüfung                    |
| 5   | Hochschulwechsel                                        |
| 6   | Ableistung eines Dienstes                               |
| 7   | Aufgabe des Studiums                                    |
| 8   | Streichung d.d.HS wg.fehlender Rückmeldg./Krankv.       |
| 9   | Beendigung n. endgültig nicht bestand.Prüfung/VPr.      |
| 10  | sonstige Gründe                                         |
| 11  | Fachwechsel                                             |
| 12  | Hochschulpartnerschaft/Erasmus                          |
| 13  | Rückzieher                                              |
| 14  | Exmatrikulation                                         |
| 15  | logisch gelöscht                                        |
| 16  | geschlossen (Antrag oder ex lege)                       |
| 17  | geschlossen (Abschluss u./o. keine Fortsetzung möglich) |
| 18  | geschlossen (erschwert zu öffnen)                       |
| 19  | Verzicht auf Studienplatz                               |
| 20  | Rücktritt von Immatrikulation                           |

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|    |                      |
|----|----------------------|
| 21 | nicht zurückgemeldet |
| 22 | Fehler               |

**I.9 terms\_before**

*Description:* The number of course study terms a student has before registering at the current university.  
This differ from zero only if a student switches universities.

Table 65: The attribute 'terms\_before'.

| Property  | Value                              |
|-----------|------------------------------------|
| Name      | terms_before                       |
| Label     | Number of terms before enrollment. |
| PK        | True                               |
| Type      | integer                            |
| Pattern   | "[0-9]+"                           |
| Unique id | sp0031                             |

**J subject\_term**

*Description:* Dimension 'subject\_term' of the AIStudyBuddy data model. The entity records time-dependent, i.e., term-dependent information of the subject related information.

Table 66: The entity 'subject\_term'.

| Property | Value        |
|----------|--------------|
| Name     | subject_term |
| Version  | 2.3.2        |

**J.1 subject\_term\_id**

*Description:* Id of each instance of subject\_term as sequential number.

Table 67: The attribute 'subject\_term\_id'.

| Property | Value            |
|----------|------------------|
| Name     | subject_term_id  |
| Label    | Id of dimension. |
| PK       | True             |
| Type     | integer          |

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|           |           |
|-----------|-----------|
| Pattern   | "[0-9]+"  |
| Unique id | v0203n023 |

## J.2 subject\_id

*Description:* Since subject is the time-independent component of subject\_term, each instance of subject\_term is associated to one and only one instance of subject.

Table 68: The attribute 'subject\_id'.

| Property  | Value              |
|-----------|--------------------|
| Name      | subject_id         |
| FK        | subject.subject_id |
| Unique id | v0203n022          |

## J.3 term\_date

*Description:* The term the information of this dimension are related to.

Table 69: The attribute 'term\_date'.

| Property  | Value             |
|-----------|-------------------|
| Name      | term_date         |
| Label     | The current term. |
| Type      | string            |
| Pattern   | "[0-9]{4}(SS WS)" |
| Format    | yyyy(SS WS)       |
| Unique id | op0012            |

## J.4 er\_edition

*Description:* An identifier of the edition of a degree program/examination regulations (er).

Table 70: The attribute 'er\_edition'.

| Property | Value                                                  |
|----------|--------------------------------------------------------|
| Name     | er_edition                                             |
| Label    | Edition of the degree program/examination regulations. |
| Type     | string                                                 |
| Pattern  | ".*"                                                   |

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|           |        |
|-----------|--------|
| Unique id | op0011 |
|-----------|--------|

**J.5 er\_name**

*Description:* Exact name of the degree program/examination regulations.

Table 71: The attribute 'er\_name'.

| Property  | Value                                                     |
|-----------|-----------------------------------------------------------|
| Name      | er_name                                                   |
| Label     | Exact name of the degree program/examination regulations. |
| Type      | string/text                                               |
| Pattern   | ".+"                                                      |
| Unique id | op0013                                                    |

**J.6 ind\_period**

*Description:* The individual standard period can deviate from the official standard period through extra terms (sabbatical/Corona/etc.).

Table 72: The attribute 'ind\_period'.

| Property  | Value                                        |
|-----------|----------------------------------------------|
| Name      | ind_period                                   |
| Label     | Individual standard period of study program. |
| Type      | number                                       |
| Pattern   | "[0-9]+"                                     |
| Unique id | sp0037                                       |

**K unit**

*Description:* Dimension 'unit' of the AISTudyBuddy data model. A unit is an arbitrary element for measuring progress in a student's curriculum. Units are term-dependent (i.e., specified by year and semester), but not date-dependent (here, date ment as specified by day/month/year).

Table 73: The entity 'unit'.

| Property | Value |
|----------|-------|
| Name     | unit  |

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### K.1 unit\_id

*Description:* Id of each instance of unit as sequential number.

Table 74: The attribute 'unit\_id'.

| Property  | Value            |
|-----------|------------------|
| Name      | unit_id          |
| Label     | Id of dimension. |
| PK        | True             |
| Type      | integer          |
| Pattern   | "[0-9]+"         |
| Unique id | v0203n024        |

### K.2 subject\_id

*Description:* Every unit is associated to a study subject and therefore to a degree program; this is because units are intended to measure the curriculum progress.

Table 75: The attribute 'subject\_id'.

| Property  | Value              |
|-----------|--------------------|
| Name      | subject_id         |
| FK        | subject.subject_id |
| Unique id | v0203n022          |

### K.3 parent\_unit\_id

*Description:* A unit can consists of other units or the other way around, every unit can have a parental unit. For example, a module (that would be a unit) consists out of components (that would be units, too).

Table 76: The attribute 'parent\_unit\_id'.

| Property  | Value          |
|-----------|----------------|
| Name      | parent_unit_id |
| FK        | unit.unit_id   |
| Unique id | v0203n024      |

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**K.4 instance\_level***Description:* Level of recursion.

Table 77: The attribute 'instance\_level'.

| Property  | Value               |
|-----------|---------------------|
| Name      | instance_level      |
| Label     | Level of recursion. |
| Type      | integer             |
| Pattern   | "[0-9]+"            |
| Unique id | v0203n033           |

**K.5 instance\_name***Description:* If the data maintainer wants to structure the levels of instance better, they have the possibility to label the instances, e.g., subject profiles, modules, components for level one, two and three.

Table 78: The attribute 'instance\_name'.

| Property  | Value              |
|-----------|--------------------|
| Name      | instance_name      |
| Label     | Name of recursion. |
| Type      | string             |
| Pattern   | ". "               |
| Unique id | v0203n034          |

**K.6 unit\_name***Description:* The name of the unit, e.g., the name of a subject profile, a module, or a course.

Table 79: The attribute 'unit\_name'.

| Property  | Value             |
|-----------|-------------------|
| Name      | unit_name         |
| Label     | Name of the unit. |
| Type      | string            |
| Pattern   | ". "              |
| Unique id | sp0019            |

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### K.7 unit\_type

*Description:* The type of a unit like a course, a lecture, an exercise, a module, or else.

Table 80: The attribute 'unit\_type'.

| Property  | Value                 |
|-----------|-----------------------|
| Name      | unit_type             |
| Label     | The type of the unit. |
| Type      | string                |
| Pattern   | ". "                  |
| Unique id | sp0020                |

### K.8 unit\_date

*Description:* Units are often identical in instance, name and type. To distinguish them better, the time of their first appearance is stored. This does not have to be exact, like for lectures the first date of the term is adequate. For exams, the exact date of their happening should be stored to distinguish from resit exams.

Table 81: The attribute 'unit\_date'.

| Property  | Value             |
|-----------|-------------------|
| Name      | unit_date         |
| Label     | Date of the unit. |
| PK        | True              |
| Type      | date              |
| Pattern   | "\d{4}-\d\d-\d\d" |
| Format    | yyyy-mm-dd        |
| Unique id | op0024            |

### K.9 reward\_type

*Description:* An enumeration of different reward types. For mapping to different types of units, it is necessary to map to different types of rewards, too. An exam relies on credit points, but an exercise relies on exercise points.

Table 82: The attribute 'reward\_type'.

| Property | Value           |
|----------|-----------------|
| Name     | reward_type     |
| Label    | Type of reward. |



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|           |              |
|-----------|--------------|
| Type      | string       |
| Pattern   | "(cp ex nn)" |
| Unique id | op0020       |

Table 83: The value key table of 'reward\_type'.

| Key | Value           |
|-----|-----------------|
| cp  | Credit points   |
| ex  | Exercise points |
| nn  | No reward.      |

**K.10 reward\_amount***Description:* Amount of reward.

Table 84: The attribute 'reward\_amount'.

| Property  | Value              |
|-----------|--------------------|
| Name      | reward_amount      |
| Label     | Amount of reward.  |
| Type      | float              |
| Pattern   | "([0-9]+)([0-9])?" |
| Unique id | op0021             |

**K.11 grade***Description:* Final grade of a unit.

Table 85: The attribute 'grade'.

| Property  | Value                  |
|-----------|------------------------|
| Name      | grade                  |
| Label     | Final grade of a unit. |
| Type      | float                  |
| Pattern   | "[0-5](\.[0-9])?"      |
| Unique id | sp0024                 |

**K.12 is\_active***Description:* By repetition of courses, concurrent units can be recorded. To be sure which unit is the one that should be considered for computations of credit points, average grades, etc., the most currently is marked as active.

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Table 86: The attribute 'is\_active'.

| Property  | Value            |
|-----------|------------------|
| Name      | is_active        |
| Label     | State of module. |
| Type      | boolean          |
| Pattern   | "(false true)"   |
| Unique id | op0023           |

## L unit\_event

*Description:* Dimension 'unitEvent' of the AIStudyBuddy data model. The entity records time-dependent information of the unit related information. This can be several per unit per term, for example if a student participates in an exam and the resit exam.

Table 87: The entity 'unit\_event'.

| Property | Value      |
|----------|------------|
| Name     | unit_event |
| Version  | 2.3.2      |

### L.1 unit\_event\_id

*Description:* Id of each instance of unit\_event as sequential number.

Table 88: The attribute 'unit\_event\_id'.

| Property  | Value            |
|-----------|------------------|
| Name      | unit_event_id    |
| Label     | Id of dimension. |
| PK        | True             |
| Type      | integer          |
| Pattern   | "[0-9]+"         |
| Unique id | v0203n026        |

### L.2 unit\_id

*Description:* Since the unit\_events are the date-dependent parts of a unit, each instance of unit\_event is associated to one and only one instance of unit.

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Table 89: The attribute 'unit\_id'.

| Property  | Value        |
|-----------|--------------|
| Name      | unit_id      |
| FK        | unit.unit_id |
| Unique id | v0203n024    |

**L.3 term\_date**

*Description:* We record two time-related information. Term\_date is the term an event is related to, while event\_date is the date an event happend. For example, the result of an exam can be announced delayed in one term (where the event\_date takes place), while the exam happened in the previous term (the term\_date).

Table 90: The attribute 'term\_date'.

| Property  | Value                          |
|-----------|--------------------------------|
| Name      | term_date                      |
| Label     | The current term of the event. |
| Type      | string                         |
| Pattern   | "[0-9]{4}(SS WS)"              |
| Format    | yyyy(SS WS)                    |
| Unique id | op0016                         |

**L.4 state**

*Description:* The state of the event respectively the unit. For exams, typical events would be 'Angemeldet', 'Teilgenommen', 'Bestanden'.

Table 91: The attribute 'state'.

| Property  | Value               |
|-----------|---------------------|
| Name      | state               |
| Label     | State of the event. |
| Type      | string              |
| Pattern   | ".*"                |
| Unique id | sp0025              |

**L.5 grade**

*Description:* All events compose a grade history of the corresponding unit. Please use '0' if the grade is unknown.

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Table 92: The attribute 'grade'.

| Property  | Value              |
|-----------|--------------------|
| Name      | grade              |
| Label     | Grade of the unit. |
| Type      | float              |
| Pattern   | "[0-5](\.[0-9])?"  |
| Unique id | op0017             |

#### L.6 event\_active

*Description:* To find the most recent event of a unit, all units are marked as inactive (false), while the most recent event is marked as active (true).

Table 93: The attribute 'event\_active'.

| Property  | Value           |
|-----------|-----------------|
| Name      | event_active    |
| Label     | Stage of event. |
| Type      | boolean         |
| Pattern   | "(false true)"  |
| Unique id | op0018          |

#### L.7 event\_date

*Description:* See the description of 'term\_date'.

Table 94: The attribute 'event\_date'.

| Property  | Value              |
|-----------|--------------------|
| Name      | event_date         |
| Label     | Date of the event. |
| Type      | date               |
| Pattern   | "\d{4}-\d\d-\d\d"  |
| Format    | yyyy-mm-dd         |
| Unique id | sp0026             |

#### L.8 comment

*Description:* To reproduce the exam history of students, we need more attributes than we already have. For example, the same exam can be passed two times, but only the one with the more favorably result counts. Cancellation or deletion of events can be logged in the comment attribute.

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Table 95: The attribute 'comment'.

| Property  | Value                  |
|-----------|------------------------|
| Name      | comment                |
| Label     | Comment on this event. |
| Type      | string                 |
| Pattern   | ".*"                   |
| Unique id | op0022                 |

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## J. Data Reference Model 3.6.0

The following printout of yaml files presents the DRM 3.6.0 and describes entities and their attributes bei yaml objects.

```

1 - $id: v3.5.0-Draft
2   $schema: schema.json
3   abbrev: area
4   attributes:
5     - deprecated: false
6       description: ID that is used as an unique designation for an area at one location
7         (university)
8       enum: null
9       format: ''
10      pattern: .*
11      title: area_id
12      type: string
13      x-aisb-dbms-attr:
14        check: ''
15        collate: ''
16        default: ''
17        fk: ''
18        generatedValue: ''
19        notNull: true
20        pk: true
21        size: null
22        specialType: string
23        unique: false
24      x-aisb-doc-attr:
25        comments: The unique designation used does not change over time.
26        constraints: ''
27        entities: ''
28        explanation: ''
29        jointRespAggre:
30          de: ''
31          en: ''
32        label: Area ID
33        tags: ''
34        unique_id: ''
35        version:
36          created:
37            authors: RMS/BUW
38            date: '2024-07-23'
39            number: v3.5.0
40          updated:
41            authors: ''
42            date: null
43            number: ''
44        virtual: false
45    - deprecated: false
46      description: Child areas that are related to the area.
47      enum: null
48      format: ''
49      pattern: ''
50      title: area_child_area_ids
51      type: string[]
52      x-aisb-dbms-attr:
53        check: ''
54        collate: ''
55        default: ''

```

```

56     fk: area.area_id
57     generatedValue: ''
58     notNull: false
59     pk: false
60     size: null
61     specialType: string[]
62     unique: false
63 x-aisb-doc-attr:
64     comments: This field is intended to create hierarchical structures.
65     constraints: ''
66     entities: ''
67     explanation: ''
68     jointRespAggre:
69         de: ''
70         en: ''
71     label: Children of the area
72     tags: ''
73     unique_id: ''
74     version:
75         created:
76             authors: RMS/BUW
77             date: '2024-07-23'
78             number: v3.5.0
79         updated:
80             authors: PP/BUW
81             date: '2024-10-29'
82             number: v.3.5.2
83     virtual: false
84 - deprecated: false
85     description: Long (and short if available) name of the area.
86     enum: null
87     format: ''
88     pattern: ''
89     title: area_name
90     type: '#LocalizedName'
91 x-aisb-dbms-attr:
92     check: ''
93     collate: ''
94     default: ''
95     fk: ''
96     generatedValue: ''
97     notNull: true
98     pk: false
99     size: null
100    specialType: '#LocalizedName'
101    unique: false
102 x-aisb-doc-attr:
103     comments: ''
104     constraints: ''
105     entities: ''
106     explanation: ''
107     jointRespAggre:
108         de: ''
109         en: ''
110     label: Name of area
111     tags: ''
112     unique_id: ''
113     version:
114         created:
115             authors: RMS/BUW
116             date: '2024-07-23'
117             number: v3.5.0
118         updated:

```



```

119         authors: ''
120         date: null
121         number: ''
122         virtual: false
123     - deprecated: false
124     description: Marks this area as a selectable area.
125     enum: null
126     format: ''
127     pattern: ([01])?
128     title: area_selectable
129     type: boolean
130     x-aisb-dbms-attr:
131         check: ''
132         collate: ''
133         default: ''
134         fk: ''
135         generatedValue: ''
136         notNull: false
137         pk: false
138         size: null
139         specialType: boolean
140         unique: false
141     x-aisb-doc-attr:
142         comments: ''
143         constraints: ''
144         entities: ''
145         explanation: ''
146         jointRespAggre:
147             de: ''
148             en: ''
149         label: Flag of eligibility
150         tags: ''
151         unique_id: ''
152         version:
153             created:
154                 authors: RMS/BUW
155                 date: '2024-07-23'
156                 number: v3.5.0
157             updated:
158                 authors: PP/BUW
159                 date: '2024-10-29'
160                 number: v.3.5.2
161         virtual: false
162     - deprecated: false
163     description: Conditions and requirements for the area.
164     enum: null
165     format: ''
166     pattern: ''
167     title: area_requirements
168     type: '#Requirements'
169     x-aisb-dbms-attr:
170         check: ''
171         collate: ''
172         default: ''
173         fk: ''
174         generatedValue: ''
175         notNull: false
176         pk: false
177         size: null
178         specialType: '#Requirements'
179         unique: false
180     x-aisb-doc-attr:
181         comments: ''

```

```

182     constraints: ''
183     entities: ''
184     explanation: ''
185     jointRespAggre:
186         de: ''
187         en: ''
188     label: Requirements of the area
189     tags: ''
190     unique_id: ''
191     version:
192         created:
193             authors: RMS/BUW
194             date: '2024-07-23'
195             number: v3.5.0
196         updated:
197             authors: ''
198             date: null
199             number: ''
200     virtual: false
201 - deprecated: false
202     description: Maximum amount of times a student can switch their selection of the
203     area
204     enum: null
205     format: ''
206     pattern: d*
207     title: area_max_switches
208     type: integer
209     x-aisb-dbms-attr:
210         check: ''
211         collate: ''
212         default: ''
213         fk: ''
214         generatedValue: ''
215         notNull: false
216         pk: false
217         size: null
218         specialType: integer
219         unique: false
220     x-aisb-doc-attr:
221         comments: ''
222         constraints: ''
223         entities: ''
224         explanation: ''
225         jointRespAggre:
226             de: ''
227             en: ''
228         label: Maximum amount of switches for the area
229         tags: ''
230         unique_id: ''
231         version:
232             created:
233                 authors: RMS/BUW
234                 date: '2024-07-23'
235                 number: v3.5.0
236             updated:
237                 authors: PP/BUW
238                 date: '2024-10-29'
239                 number: v.3.5.2
240         virtual: false
241     description: Dimension 'area' of the AIStudyBuddy data model.
242     title: area
243     type: object
244     x-aisb-doc-entity:

```

```

245     comments: ''
246     constraints: ''
247     explanation: ''
248     tags: ''
249     version:
250         date: '2024-07-23'
251         number: v3.5.0
252 - $id: v3.5.0-Draft
253   $schema: schema.json
254   abbrev: asse
255   attributes:
256   - deprecated: false
257     description: ID that is used as an unique designation for an assessment_offering
258       at one location (university)
259     enum: null
260     format: ''
261     pattern: .*
262     title: asse_id
263     type: string
264     x-aisb-dbms-attr:
265         check: ''
266         collate: ''
267         default: ''
268         fk: ''
269         generatedValue: ''
270         notNull: true
271         pk: true
272         size: null
273         specialType: string
274         unique: false
275     x-aisb-doc-attr:
276         comments: The unique designation used does not change over time.
277         constraints: ''
278         entities: ''
279         explanation: ''
280         jointRespAggre:
281             de: ''
282             en: ''
283         label: Assessment Offering ID
284         tags: ''
285         unique_id: ''
286         version:
287             created:
288                 authors: RMS/BUW
289                 date: '2024-07-23'
290                 number: v3.5.0
291             updated:
292                 authors: PP/BUW
293                 date: '2024-10-16'
294                 number: v3.5.1
295         virtual: false
296   - deprecated: false
297     description: Relationship between entities that shows in which component is covered
298       by the assessment_offering.
299     enum: null
300     format: ''
301     pattern: ''
302     title: asse_comp_id
303     type: ''
304     x-aisb-dbms-attr:
305         check: ''
306         collate: ''
307         default: ''

```

```

308     fk: component.comp_id
309     generatedValue: ''
310     notNull: true
311     pk: false
312     size: null
313     specialType: ''
314     unique: false
315     x-aisb-doc-attr:
316         comments: ''
317         constraints: ''
318         entities: ''
319         explanation: ''
320         jointRespAggre:
321             de: ''
322             en: ''
323         label: Component ID
324         tags: ''
325         unique_id: ''
326         version:
327             created:
328                 authors: RMS/BUW
329                 date: '2024-07-23'
330                 number: v3.5.0
331             updated:
332                 authors: PP/BUW
333                 date: '2024-10-16'
334                 number: v3.5.1
335         virtual: false
336     - deprecated: false
337     description: Long (and short if available) name of the assessment offered.
338     enum: null
339     format: ''
340     pattern: ''
341     title: asse_name
342     type: '#LocalizedName'
343     x-aisb-dbms-attr:
344         check: ''
345         collate: ''
346         default: ''
347         fk: ''
348         generatedValue: ''
349         notNull: true
350         pk: false
351         size: null
352         specialType: '#LocalizedName'
353         unique: false
354     x-aisb-doc-attr:
355         comments: ''
356         constraints: ''
357         entities: ''
358         explanation: ''
359         jointRespAggre:
360             de: ''
361             en: ''
362         label: Name of assessment offering
363         tags: ''
364         unique_id: ''
365         version:
366             created:
367                 authors: RMS/BUW
368                 date: '2024-07-23'
369                 number: v3.5.0
370             updated:

```

```

371         authors: PP/BUW
372         date: '2024-10-16'
373         number: v3.5.1
374         virtual: false
375     - deprecated: false
376     description: Semester in which the assessment is offered.
377     enum: null
378     format: yyyy(SS|WS)
379     pattern: ([0-9]{4})(SS|WS)?
380     title: asse_term
381     type: string
382     x-aisb-dbms-attr:
383         check: ''
384         collate: ''
385         default: ''
386         fk: ''
387         generatedValue: ''
388         notNull: true
389         pk: false
390         size: null
391         specialType: string
392         unique: false
393     x-aisb-doc-attr:
394         comments: ''
395         constraints: ''
396         entities: ''
397         explanation: ''
398         jointRespAggre:
399             de: ''
400             en: ''
401         label: Term of the assessment offered
402         tags: ''
403         unique_id: ''
404         version:
405             created:
406                 authors: RMS/BUW
407                 date: '2024-07-23'
408                 number: v3.5.0
409             updated:
410                 authors: PP/BUW
411                 date: '2024-10-16'
412                 number: v3.5.1
413         virtual: false
414     description: Dimension 'assessment_offering' of the AIStudyBuddy data model.
415     title: assessment_offering
416     type: object
417     x-aisb-doc-entity:
418         comments: ''
419         constraints: ''
420         explanation: ''
421         tags: ''
422         version:
423             date: '2024-10-16'
424             number: v3.5.1
425     - $id: v3.5.0-Draft
426     $schema: schema.json
427     abbrev: comp
428     attributes:
429     - deprecated: false
430     description: ID that is used as an unique designation for a component at one location
431       (university)
432     enum: null
433     format: ''

```

```

434     pattern: .*
435     title: comp_id
436     type: string
437     x-aisb-dbms-attr:
438         check: ''
439         collate: ''
440         default: ''
441         fk: ''
442         generatedValue: ''
443         notNull: true
444         pk: true
445         size: null
446         specialType: string
447         unique: false
448     x-aisb-doc-attr:
449         comments: The unique designation used does not change over time.
450         constraints: ''
451         entities: ''
452         explanation: ''
453         jointRespAggre:
454             de: ''
455             en: ''
456         label: Component ID
457         tags: ''
458         unique_id: ''
459         version:
460             created:
461                 authors: RMS/BUW
462                 date: '2024-07-23'
463                 number: v3.5.0
464             updated:
465                 authors: ''
466                 date: null
467                 number: ''
468         virtual: false
469     - deprecated: false
470     description: Long name of the component.
471     enum: null
472     format: ''
473     pattern: ''
474     title: comp_name
475     type: '#LocalizedName'
476     x-aisb-dbms-attr:
477         check: ''
478         collate: ''
479         default: ''
480         fk: ''
481         generatedValue: ''
482         notNull: true
483         pk: false
484         size: null
485         specialType: '#LocalizedName'
486         unique: false
487     x-aisb-doc-attr:
488         comments: ''
489         constraints: ''
490         entities: ''
491         explanation: ''
492         jointRespAggre:
493             de: ''
494             en: ''
495         label: Name of the component
496         tags: ''

```

```

497     unique_id: ''
498     version:
499         created:
500             authors: RMS/BUW
501             date: '2024-07-23'
502             number: v3.5.0
503         updated:
504             authors: ''
505             date: null
506             number: ''
507     virtual: false
508 - deprecated: false
509     description: Component is valid from this date on.
510     enum: null
511     format: yyyy-mm-dd
512     pattern: (d{4}-dd-dd)?
513     title: comp_valid_from
514     type: date
515     x-aisb-dbms-attr:
516         check: ''
517         collate: ''
518         default: ''
519         fk: ''
520         generatedValue: ''
521         notNull: true
522         pk: false
523         size: null
524         specialType: date
525         unique: false
526     x-aisb-doc-attr:
527         comments: ''
528         constraints: ''
529         entities: ''
530         explanation: ''
531         jointRespAggre:
532             de: ''
533             en: ''
534         label: Date from validity
535         tags: ''
536         unique_id: ''
537         version:
538             created:
539                 authors: RMS/BUW
540                 date: '2024-07-23'
541                 number: v3.5.0
542             updated:
543                 authors: ''
544                 date: null
545                 number: ''
546         virtual: false
547 - deprecated: false
548     description: Component is deprecated since this date.
549     enum: null
550     format: yyyy-mm-dd
551     pattern: (d{4}-dd-dd)?
552     title: comp_valid_until
553     type: date
554     x-aisb-dbms-attr:
555         check: ''
556         collate: ''
557         default: ''
558         fk: ''
559         generatedValue: ''

```

```

560     nullable: true
561     pk: false
562     size: null
563     specialType: date
564     unique: false
565     x-aisb-doc-attr:
566       comments: ''
567       constraints: ''
568       entities: ''
569       explanation: ''
570       jointRespAggre:
571         de: ''
572         en: ''
573       label: Date since invalidity
574       tags: ''
575       unique_id: ''
576       version:
577         created:
578           authors: RMS/BUW
579           date: '2024-07-23'
580           number: v3.5.0
581         updated:
582           authors: ''
583           date: null
584           number: ''
585       virtual: false
586     description: Dimension 'component' of the AIStudyBuddy data model.
587     title: component
588     type: object
589     x-aisb-doc-entity:
590       comments: ''
591       constraints: ''
592       explanation: ''
593       tags: ''
594       version:
595         date: '2024-07-23'
596         number: v3.5.0
597 - $id: v3.5.0-Draft
598 $schema: schema.json
599 abbrev: cour
600 attributes:
601 - deprecated: false
602   description: ID that is used as an unique designation for a course_offering at
603     one location (university)
604   enum: null
605   format: ''
606   pattern: .*
607   title: cour_id
608   type: string
609   x-aisb-dbms-attr:
610     check: ''
611     collate: ''
612     default: ''
613     fk: ''
614     generatedValue: ''
615     nullable: true
616     pk: true
617     size: null
618     specialType: string
619     unique: false
620   x-aisb-doc-attr:
621     comments: The unique designation used does not change over time.
622     constraints: ''

```



```

623     entities: ''
624     explanation: ''
625     jointRespAggre:
626         de: ''
627         en: ''
628     label: Course offering ID
629     tags: ''
630     unique_id: ''
631     version:
632         created:
633             authors: RMS/BUW
634             date: '2024-07-23'
635             number: v3.5.0
636         updated:
637             authors: ''
638             date: null
639             number: ''
640     virtual: false
641 - deprecated: false
642     description: Relationship between entities that shows potential sub groups of
643     the offering in question.
644     enum: null
645     format: ''
646     pattern: ''
647     title: cour_grpo_ids
648     type: string[]
649     x-aisb-dbms-attr:
650         check: ''
651         collate: ''
652         default: ''
653         fk: group_offerings.grpo_id
654         generatedValue: ''
655         notNull: true
656         pk: false
657         size: null
658         specialType: string[]
659         unique: false
660     x-aisb-doc-attr:
661         comments: "In most cases there will be only one subgroup. Participants can also\
662         \ be divided into several small groups to study the same topic. Further more\
663         \ small groups may also be formed on different aspects of a general topic,\
664         \ in German this subgroups are called \u201EParallelgruppen\u201C."
665         constraints: ''
666         entities: ''
667         explanation: ''
668         jointRespAggre:
669             de: ''
670             en: ''
671         label: List of Group offering IDs
672         tags: ''
673         unique_id: ''
674         version:
675             created:
676                 authors: RMS/BUW
677                 date: '2024-07-23'
678                 number: v3.5.0
679             updated:
680                 authors: ''
681                 date: null
682                 number: ''
683         virtual: false
684 - deprecated: false
685     description: Relationship between entities that shows in which component is covered

```

```

686     by the course_offering.
687     enum: null
688     format: ''
689     pattern: ''
690     title: cour_comp_id
691     type: ''
692     x-aisb-dbms-attr:
693         check: ''
694         collate: ''
695         default: ''
696         fk: component.comp_id
697         generatedValue: ''
698         notNull: true
699         pk: false
700         size: null
701         specialType: ''
702         unique: false
703     x-aisb-doc-attr:
704         comments: ''
705         constraints: ''
706         entities: ''
707         explanation: ''
708         jointRespAggre:
709             de: ''
710             en: ''
711         label: Component ID
712         tags: ''
713         unique_id: ''
714         version:
715             created:
716                 authors: RMS/BUW
717                 date: '2024-07-23'
718                 number: v3.5.0
719             updated:
720                 authors: ''
721                 date: null
722                 number: ''
723         virtual: false
724     - deprecated: false
725     description: Long (and short if available) name of the course offered.
726     enum: null
727     format: ''
728     pattern: ''
729     title: cour_name
730     type: '#LocalizedName'
731     x-aisb-dbms-attr:
732         check: ''
733         collate: ''
734         default: ''
735         fk: ''
736         generatedValue: ''
737         notNull: true
738         pk: false
739         size: null
740         specialType: '#LocalizedName'
741         unique: false
742     x-aisb-doc-attr:
743         comments: ''
744         constraints: ''
745         entities: ''
746         explanation: ''
747         jointRespAggre:
748             de: ''

```

```

749     en: ''
750     label: Name of the course
751     tags: ''
752     unique_id: ''
753     version:
754       created:
755         authors: RMS/BUW
756         date: '2024-07-23'
757         number: v3.5.0
758       updated:
759         authors: ''
760         date: null
761         number: ''
762     virtual: false
763 - deprecated: false
764     description: Semester in which the course is offered.
765     enum: null
766     format: yyyy(SS|WS)
767     pattern: ([0-9]{4}(SS|WS))?
768     title: cour_term
769     type: string
770     x-aisb-dbms-attr:
771       check: ''
772       collate: ''
773       default: ''
774       fk: ''
775       generatedValue: ''
776       notNull: true
777       pk: false
778       size: null
779       specialType: string
780       unique: false
781     x-aisb-doc-attr:
782       comments: ''
783       constraints: ''
784       entities: ''
785       explanation: ''
786       jointRespAggre:
787         de: ''
788         en: ''
789     label: Term of the course
790     tags: ''
791     unique_id: ''
792     version:
793       created:
794         authors: RMS/BUW
795         date: '2024-07-23'
796         number: v3.5.0
797       updated:
798         authors: ''
799         date: null
800         number: ''
801     virtual: false
802 - deprecated: false
803     description: Type of the event offered.
804     enum: null
805     format: ''
806     pattern: ''
807     title: cour_type
808     type: '#LocalizedString'
809     x-aisb-dbms-attr:
810       check: ''
811       collate: ''

```

```

812     default: ''
813     fk: ''
814     generatedValue: ''
815     notNull: false
816     pk: false
817     size: null
818     specialType: '#LocalizedString'
819     unique: false
820   x-aisb-doc-attr:
821     comments: ''
822     constraints: ''
823     entities: ''
824     explanation: ''
825     jointRespAggre:
826       de: ''
827       en: ''
828     label: Type of the course
829     tags: ''
830     unique_id: ''
831     version:
832       created:
833         authors: RMS/BUW
834         date: '2024-07-23'
835         number: v3.5.0
836       updated:
837         authors: ''
838         date: null
839         number: ''
840     virtual: false
841   - deprecated: false
842     description: Room in which the offered event takes place
843     enum: null
844     format: ''
845     pattern: ''
846     title: cour_rooms
847     type: string[]
848   x-aisb-dbms-attr:
849     check: ''
850     collate: ''
851     default: ''
852     fk: ''
853     generatedValue: ''
854     notNull: false
855     pk: false
856     size: null
857     specialType: string[]
858     unique: false
859   x-aisb-doc-attr:
860     comments: ''
861     constraints: ''
862     entities: ''
863     explanation: ''
864     jointRespAggre:
865       de: ''
866       en: ''
867     label: Room of the course
868     tags: ''
869     unique_id: ''
870     version:
871       created:
872         authors: RMS/BUW
873         date: '2024-07-23'
874         number: v3.5.0

```

```

875         updated:
876         authors: ''
877         date: null
878         number: ''
879     virtual: false
880 description: Dimension 'course_offering' of the AIStudyBuddy data model.
881 title: course_offering
882 type: object
883 x-aisb-doc-entity:
884     comments: ''
885     constraints: ''
886     explanation: ''
887     tags: ''
888     version:
889         date: '2024-07-23'
890         number: v3.5.0
891 - $id: v3.5.0-Draft
892 $schema: schema.json
893 abbrev: depr
894 attributes:
895 - deprecated: false
896   description: ID that is used as an unique designation for a degree program at
897     one location (university)
898   enum: null
899   format: ''
900   pattern: .*
901   title: depr_id
902   type: string
903 x-aisb-dbms-attr:
904     check: ''
905     collate: ''
906     default: ''
907     fk: ''
908     generatedValue: ''
909     notNull: true
910     pk: true
911     size: null
912     specialType: string
913     unique: false
914 x-aisb-doc-attr:
915     comments: The unique designation used does not change over time.
916     constraints: ''
917     entities: ''
918     explanation: ''
919     jointRespAggre:
920         de: ''
921         en: ''
922     label: Degree program ID
923     tags: ''
924     unique_id: v0203n018
925     version:
926         created:
927             authors: JEF/BUW
928             date: '2023-02-17'
929             number: v2.3.0
930         updated:
931             authors: PP/BUW
932             date: '2024-10-29'
933             number: v.3.5.2
934     virtual: false
935 - deprecated: false
936   description: Reference to the student studying the degree program.
937   enum: null

```

```

938     format: ''
939     pattern: ''
940     title: depr_stud_id
941     type: ''
942     x-aisb-dbms-attr:
943         check: ''
944         collate: ''
945         default: ''
946         fk: student.stud_id
947         generatedValue: ''
948         notNull: true
949         pk: false
950         size: null
951         specialType: ''
952         unique: false
953     x-aisb-doc-attr:
954         comments: ''
955         constraints: ''
956         entities: ''
957         explanation: ''
958         jointRespAggre:
959             de: ''
960             en: ''
961         label: Student ID
962         tags: ''
963         unique_id: v0203n010
964         version:
965             created:
966                 authors: RMS/BUW
967                 date: '2024-06-06'
968                 number: v3.5.0
969             updated:
970                 authors: PP/BUW
971                 date: '2024-10-29'
972                 number: v.3.5.2
973         virtual: false
974     - deprecated: false
975     description: If in the raw databases present, this is the grade as the student
976         management systems record by term for the degree program. This makes it possible
977         to compare self-generated grades to original ones. If student management systems
978         do not record this attribute, it will be just '0'.
979     enum: null
980     format: ''
981     pattern: ([0-5](.[0-9])?)?
982     title: depr_grade_total
983     type: float
984     x-aisb-dbms-attr:
985         check: ''
986         collate: ''
987         default: ''
988         fk: ''
989         generatedValue: ''
990         notNull: false
991         pk: false
992         size: null
993         specialType: float
994         unique: false
995     x-aisb-doc-attr:
996         comments: ''
997         constraints: ''
998         entities: ''
999         explanation: ''
1000     jointRespAggre:

```

```

1001     de: ''
1002     en: ''
1003     label: Grade of the degree program
1004     tags: ''
1005     unique_id: sp0014
1006     version:
1007         created:
1008             authors: JEF/BUW
1009             date: '2022-07-25'
1010             number: v1.0.0
1011         updated:
1012             authors: PP/BUW
1013             date: '2024-10-29'
1014             number: v.3.5.2
1015     virtual: false
1016 - deprecated: false
1017     description: If in the raw databases present, this are the credits as the student
1018                 management systems record by term for the degree program. This makes it possible
1019                 to compare self-generated credit sums to original ones. If student management
1020                 system do not record this attribute, it will be just '-1'.
1021     enum: null
1022     format: ''
1023     pattern: (d+(.d+)?)?
1024     title: depr_credit_points_total
1025     type: float
1026     x-aisb-dbms-attr:
1027         check: ''
1028         collate: ''
1029         default: ''
1030         fk: ''
1031         generatedValue: ''
1032         notNull: false
1033         pk: false
1034         size: null
1035         specialType: float
1036         unique: false
1037     x-aisb-doc-attr:
1038         comments: ''
1039         constraints: ''
1040         entities: ''
1041         explanation: ''
1042         jointRespAggre:
1043             de: ''
1044             en: ''
1045     label: Credit Points of the degree program
1046     tags: ''
1047     unique_id: sp0015
1048     version:
1049         created:
1050             authors: JEF/BUW
1051             date: '2022-07-25'
1052             number: v1.0.0
1053         updated:
1054             authors: PP/BUW
1055             date: '2024-10-29'
1056             number: v.3.5.2
1057     virtual: false
1058     description: Dimension 'degree_program' of the AIStudyBuddy data model.
1059     title: degree_program
1060     type: object
1061     x-aisb-doc-entity:
1062         comments: ''
1063         constraints: ''

```

```

1064     explanation: ''
1065     tags: ''
1066     version:
1067         date: '2024-06-06'
1068         number: v3.5.0
1069 - $id: v3.5.0-Draft
1070 $schema: schema.json
1071 abbrev: dept
1072 attributes:
1073 - deprecated: false
1074   description: The degree program to which the information from degree_program refers.
1075   enum: null
1076   format: ''
1077   pattern: ''
1078   title: dept_depr_id
1079   type: ''
1080   x-aisb-dbms-attr:
1081       check: ''
1082       collate: ''
1083       default: ''
1084       fk: degree_program.depr_id
1085       generatedValue: ''
1086       notNull: true
1087       pk: true
1088       size: null
1089       specialType: ''
1090       unique: false
1091   x-aisb-doc-attr:
1092       comments: ''
1093       constraints: ''
1094       entities: ''
1095       explanation: ''
1096       jointRespAggre:
1097         de: ''
1098         en: ''
1099       label: Degree program ID
1100       tags: ''
1101       unique_id: v0203n019
1102       version:
1103         created:
1104             authors: JEF/BUW
1105             date: '2023-02-07'
1106             number: v2.3.0
1107         updated:
1108             authors: PP/BUW
1109             date: '2024-10-29'
1110             number: v.3.5.2
1111       virtual: false
1112 - deprecated: false
1113   description: The term the information of this dimension are related to.
1114   enum: null
1115   format: yyyy(SS|WS)
1116   pattern: ([0-9]{4}(SS|WS))?
1117   title: dept_term
1118   type: string
1119   x-aisb-dbms-attr:
1120       check: ''
1121       collate: ''
1122       default: ''
1123       fk: ''
1124       generatedValue: ''
1125       notNull: true
1126       pk: true

```



```

1127     size: null
1128     specialType: string
1129     unique: false
1130 x-aisb-doc-attr:
1131     comments: ''
1132     constraints: ''
1133     entities: ''
1134     explanation: ''
1135     jointRespAggre:
1136         de: ''
1137         en: ''
1138     label: Current Term
1139     tags: ''
1140     unique_id: op0004
1141     version:
1142         created:
1143             authors: JEF/BUW
1144             date: '2022-10-31'
1145             number: v2.0.RC1
1146         updated:
1147             authors: RMS/BUW
1148             date: '2024-06-06'
1149             number: v3.5.0
1150     virtual: false
1151 - deprecated: false
1152 description: Type of the degree program a student is participating. Possible values
1153 are listed in the enumeration table.
1154 enum:
1155 - description: Erststudium
1156   value: '1'
1157 - description: Konsekutives Masterstudium
1158   value: '2'
1159 - description: Zweitstudium
1160   value: '3'
1161 - description: Aufbaustudium
1162   value: '4'
1163 - description: Promotionsstudium
1164   value: '5'
1165 - description: Andere
1166   value: '6'
1167 format: ''
1168 pattern: d{0,1}
1169 title: dept_type_key
1170 type: integer
1171 x-aisb-dbms-attr:
1172     check: ''
1173     collate: ''
1174     default: ''
1175     fk: ''
1176     generatedValue: ''
1177     notNull: true
1178     pk: false
1179     size: null
1180     specialType: integer
1181     unique: false
1182 x-aisb-doc-attr:
1183     comments: ''
1184     constraints: ''
1185     entities: ''
1186     explanation: ''
1187     jointRespAggre:
1188         de: ''
1189         en: ''

```

```

1190     label: Type of study program
1191     tags: ''
1192     unique_id: sp0003
1193     version:
1194         created:
1195             authors: JEF/BUW
1196             date: '2022-07-25'
1197             number: v1.0.0
1198         updated:
1199             authors: PP/BUW
1200             date: '2024-10-29'
1201             number: v.3.5.2
1202     virtual: false
1203     description: Dimension 'degree_program_term' of the AIStudyBuddy data model.
1204     title: degree_program_term
1205     type: object
1206     x-aisb-doc-entity:
1207         comments: ''
1208         constraints: ''
1209         explanation: ''
1210         tags: ''
1211         version:
1212             date: '2024-06-06'
1213             number: v3.5.0
1214 - $id: v3.5.0-Draft
1215   $schema: schema.json
1216   abbrev: enrt
1217   attributes:
1218   - deprecated: false
1219     description: The student to which the information from enrollment_term refers.
1220     enum: null
1221     format: ''
1222     pattern: ''
1223     title: enrt_stud_id
1224     type: ''
1225     x-aisb-dbms-attr:
1226         check: ''
1227         collate: ''
1228         default: ''
1229         fk: student.stud_id
1230         generatedValue: ''
1231         notNull: true
1232         pk: true
1233         size: null
1234         specialType: ''
1235         unique: false
1236     x-aisb-doc-attr:
1237         comments: ''
1238         constraints: ''
1239         entities: ''
1240         explanation: ''
1241         jointRespAggre:
1242             de: ''
1243             en: ''
1244         label: Student ID
1245         tags: ''
1246         unique_id: v0203n010
1247         version:
1248             created:
1249                 authors: RMS/BUW
1250                 date: '2024-06-06'
1251                 number: v3.5.0
1252             updated:

```

```

1253         authors: RMS/BUW
1254         date: '2024-06-06'
1255         number: v3.5.0
1256         virtual: false
1257     - deprecated: false
1258     description: The semester to which the information from enrollment_term refers.
1259     enum: null
1260     format: yyyy(SS|WS)
1261     pattern: ([0-9]{4})(SS|WS)?
1262     title: enrt_term
1263     type: string
1264     x-aisb-dbms-attr:
1265         check: ''
1266         collate: ''
1267         default: ''
1268         fk: ''
1269         generatedValue: ''
1270         notNull: true
1271         pk: true
1272         size: null
1273         specialType: string
1274         unique: false
1275     x-aisb-doc-attr:
1276         comments: ''
1277         constraints: ''
1278         entities: ''
1279         explanation: ''
1280         jointRespAggre:
1281             de: ''
1282             en: ''
1283         label: Current Term
1284         tags: ''
1285         unique_id: op0001
1286         version:
1287             created:
1288                 authors: JEF/BUW
1289                 date: '2022-10-31'
1290                 number: v2.0RC1
1291             updated:
1292                 authors: RMS/BUW
1293                 date: '2024-06-06'
1294                 number: v3.5.0
1295         virtual: false
1296     - deprecated: false
1297     description: Total number of semesters the student is enrolled for the semester
1298         in question
1299     enum: null
1300     format: ''
1301     pattern: d*
1302     title: enrt_term_total
1303     type: integer
1304     x-aisb-dbms-attr:
1305         check: ''
1306         collate: ''
1307         default: ''
1308         fk: ''
1309         generatedValue: ''
1310         notNull: true
1311         pk: false
1312         size: null
1313         specialType: integer
1314         unique: false
1315     x-aisb-doc-attr:

```

```

1316     comments: ''
1317     constraints: ''
1318     entities: ''
1319     explanation: ''
1320     jointRespAggre:
1321         de: ''
1322         en: ''
1323     label: Term number
1324     tags: ''
1325     unique_id: ''
1326     version:
1327         created:
1328             authors: RMS/BUW
1329             date: '2024-06-06'
1330             number: v3.5.0
1331         updated:
1332             authors: RMS/BUW
1333             date: '2024-06-06'
1334             number: v3.5.0
1335     virtual: false
1336 - deprecated: false
1337     description: Degree of participation in the university's study programs. Possible
1338         values are listed in the enumeration table.
1339     enum:
1340     - description: "Hauptth\xF6rer*in"
1341       value: '1'
1342     - description: "Zweith\xF6rer*in"
1343       value: '2'
1344     - description: Studienkolleg
1345       value: '3'
1346     - description: "Gasth\xF6rer*in"
1347       value: '4'
1348     - description: Promovend*in
1349       value: '5'
1350     format: ''
1351     pattern: d{0,1}
1352     title: enrt_status_key
1353     type: integer
1354     x-aisb-dbms-attr:
1355         check: ''
1356         collate: ''
1357         default: ''
1358         fk: ''
1359         generatedValue: ''
1360         notNull: true
1361         pk: false
1362         size: null
1363         specialType: integer
1364         unique: false
1365     x-aisb-doc-attr:
1366         comments: ''
1367         constraints: ''
1368         entities: ''
1369         explanation: ''
1370         jointRespAggre:
1371             de: ''
1372             en: ''
1373         label: Status of student
1374         tags: ''
1375         unique_id: ix0024
1376         version:
1377             created:
1378                 authors: JEF/BUW

```

```

1379         date: '2022-07-25'
1380         number: v1.1.0
1381     updated:
1382         authors: PP/BUW
1383         date: '2024-10-29'
1384         number: v.3.5.2
1385     virtual: false
1386 - deprecated: false
1387     description: "Comment on the student\u2019s status"
1388     enum: null
1389     format: ''
1390     pattern: .*
1391     title: enrt_status_comment
1392     type: string
1393     x-aisb-dbms-attr:
1394         check: ''
1395         collate: ''
1396         default: ''
1397         fk: ''
1398         generatedValue: ''
1399         notNull: false
1400         pk: false
1401         size: null
1402         specialType: string
1403         unique: false
1404     x-aisb-doc-attr:
1405         comments: ''
1406         constraints: ''
1407         entities: ''
1408         explanation: ''
1409         jointRespAggre:
1410             de: ''
1411             en: ''
1412         label: Status comment
1413         tags: ''
1414         unique_id: ''
1415         version:
1416             created:
1417                 authors: RMS/BUW
1418                 date: '2024-06-06'
1419                 number: V3.5.0
1420             updated:
1421                 authors: PP/BUW
1422                 date: '2024-10-16'
1423                 number: v3.5.1
1424         virtual: false
1425 - deprecated: false
1426     description: Marks this term as sabbatical term.
1427     enum: null
1428     format: ''
1429     pattern: ([01])?
1430     title: enrt_is_sabbatical
1431     type: boolean
1432     x-aisb-dbms-attr:
1433         check: ''
1434         collate: ''
1435         default: ''
1436         fk: ''
1437         generatedValue: ''
1438         notNull: true
1439         pk: false
1440         size: null
1441         specialType: boolean

```

```

1442     unique: false
1443   x-aisb-doc-attr:
1444     comments: This flag must be set if the student cannot study in the semester
1445       in question for any reason (e.g. sabbatical, internship or semester abroad)
1446     constraints: ''
1447     entities: ''
1448     explanation: ''
1449     jointRespAggre:
1450       de: ''
1451       en: ''
1452     label: Flag of sabbatical term
1453     tags: ''
1454     unique_id: v0203n016
1455     version:
1456       created:
1457         authors: JEF/BUW
1458         date: '2023-02-07'
1459         number: v2.3.0
1460       updated:
1461         authors: PP/BUW
1462         date: '2024-10-16'
1463         number: v3.5.1
1464     virtual: false
1465   description: Dimension 'enrollment_term' of the AIStudyBuddy data model.
1466   title: enrollment_term
1467   type: object
1468   x-aisb-doc-entity:
1469     comments: ''
1470     constraints: ''
1471     explanation: ''
1472     tags: ''
1473     version:
1474       date: '2024-06-06'
1475       number: v3.5.0
1476 - $id: v3.5.0-Draft
1477 $schema: schema.json
1478 abbrev: exam
1479 attributes:
1480 - deprecated: false
1481   description: ID that is used as an unique designation for an exam_offering at
1482     one location (university)
1483   enum: null
1484   format: ''
1485   pattern: .*
1486   title: exam_id
1487   type: string
1488   x-aisb-dbms-attr:
1489     check: ''
1490     collate: ''
1491     default: ''
1492     fk: ''
1493     generatedValue: ''
1494     notNull: true
1495     pk: true
1496     size: null
1497     specialType: string
1498     unique: false
1499   x-aisb-doc-attr:
1500     comments: The unique designation used does not change over time.
1501     constraints: ''
1502     entities: ''
1503     explanation: ''
1504     jointRespAggre:

```

```

1505         de: ''
1506         en: ''
1507         label: Exam offering ID
1508         tags: ''
1509         unique_id: ''
1510         version:
1511             created:
1512                 authors: RMS/BUW
1513                 date: '2024-07-23'
1514                 number: v3.5.0
1515             updated:
1516                 authors: ''
1517                 date: null
1518                 number: ''
1519         virtual: false
1520 - deprecated: false
1521         description: Relationship between entities that shows in which component is covered
1522         by the exam_offering.
1523         enum: null
1524         format: ''
1525         pattern: ''
1526         title: exam_comp_id
1527         type: ''
1528         x-aisb-dbms-attr:
1529             check: ''
1530             collate: ''
1531             default: ''
1532             fk: component.comp_id
1533             generatedValue: ''
1534             notNull: true
1535             pk: false
1536             size: null
1537             specialType: ''
1538             unique: false
1539         x-aisb-doc-attr:
1540             comments: ''
1541             constraints: ''
1542             entities: ''
1543             explanation: ''
1544             jointRespAggre:
1545                 de: ''
1546                 en: ''
1547             label: Component ID
1548             tags: ''
1549             unique_id: ''
1550             version:
1551                 created:
1552                     authors: RMS/BUW
1553                     date: '2024-07-23'
1554                     number: v3.5.0
1555                 updated:
1556                     authors: ''
1557                     date: null
1558                     number: ''
1559             virtual: false
1560 - deprecated: false
1561         description: Long (and short if available) name of the exam.
1562         enum: null
1563         format: ''
1564         pattern: ''
1565         title: exam_name
1566         type: '#LocalizedName'
1567         x-aisb-dbms-attr:

```

```

1568     check: ''
1569     collate: ''
1570     default: ''
1571     fk: ''
1572     generatedValue: ''
1573     notNull: true
1574     pk: false
1575     size: null
1576     specialType: '#LocalizedName'
1577     unique: false
1578   x-aisb-doc-attr:
1579     comments: ''
1580     constraints: ''
1581     entities: ''
1582     explanation: ''
1583     jointRespAggre:
1584       de: ''
1585       en: ''
1586     label: Name of the exam
1587     tags: ''
1588     unique_id: ''
1589     version:
1590       created:
1591         authors: RMS/BUW
1592         date: '2024-07-23'
1593         number: v3.5.0
1594       updated:
1595         authors: ''
1596         date: null
1597         number: ''
1598     virtual: false
1599   - deprecated: false
1600   description: Semester in which the exam is offered.
1601   enum: null
1602   format: yyyy(SS|WS)
1603   pattern: ([0-9]{4}(SS|WS))?
1604   title: exam_term
1605   type: string
1606   x-aisb-dbms-attr:
1607     check: ''
1608     collate: ''
1609     default: ''
1610     fk: ''
1611     generatedValue: ''
1612     notNull: true
1613     pk: false
1614     size: null
1615     specialType: string
1616     unique: false
1617   x-aisb-doc-attr:
1618     comments: ''
1619     constraints: ''
1620     entities: ''
1621     explanation: ''
1622     jointRespAggre:
1623       de: ''
1624       en: ''
1625     label: Term of the exam
1626     tags: ''
1627     unique_id: ''
1628     version:
1629       created:
1630         authors: RMS/BUW

```



```

1631         date: '2024-07-23'
1632         number: v3.5.0
1633         updated:
1634             authors: ''
1635             date: null
1636             number: ''
1637         virtual: false
1638     - deprecated: false
1639     description: Date on which the examination is taken and its start time.
1640     enum: null
1641     format: yyyy-mm-dd hh:mi:ss
1642     pattern: (d{4}-dd-dd dd:dd:dd)?
1643     title: exam_start_date
1644     type: datetime
1645     x-aisb-dbms-attr:
1646         check: ''
1647         collate: ''
1648         default: ''
1649         fk: ''
1650         generatedValue: ''
1651         notNull: false
1652         pk: false
1653         size: null
1654         specialType: datetime
1655         unique: false
1656     x-aisb-doc-attr:
1657         comments: 00:00 as time for unknown exam time
1658         constraints: ''
1659         entities: ''
1660         explanation: ''
1661         jointRespAggre:
1662             de: ''
1663             en: ''
1664         label: Offered time to take the exam
1665         tags: ''
1666         unique_id: ''
1667         version:
1668             created:
1669                 authors: RMS/BUW
1670                 date: '2024-07-23'
1671                 number: v3.5.0
1672             updated:
1673                 authors: ''
1674                 date: null
1675                 number: ''
1676         virtual: false
1677     - deprecated: false
1678     description: Date on which the examination is taken and its end time.
1679     enum: null
1680     format: yyyy-mm-dd hh:mi:ss
1681     pattern: (d{4}-dd-dd dd:dd:dd)?
1682     title: exam_end_date
1683     type: datetime
1684     x-aisb-dbms-attr:
1685         check: ''
1686         collate: ''
1687         default: ''
1688         fk: ''
1689         generatedValue: ''
1690         notNull: false
1691         pk: false
1692         size: null
1693         specialType: datetime

```

```

1694     unique: false
1695   x-aisb-doc-attr:
1696     comments: 00:00 as time for unknown exam time
1697     constraints: ''
1698     entities: ''
1699     explanation: ''
1700   jointRespAggre:
1701     de: ''
1702     en: ''
1703   label: Offered time to complete the exam
1704   tags: ''
1705   unique_id: ''
1706   version:
1707     created:
1708       authors: RMS/BUW
1709       date: '2024-07-23'
1710       number: v3.5.0
1711     updated:
1712       authors: ''
1713       date: null
1714       number: ''
1715   virtual: false
1716   description: Dimension 'exam_offering' of the AIStudyBuddy data model.
1717   title: exam_offering
1718   type: object
1719   x-aisb-doc-entity:
1720     comments: ''
1721     constraints: ''
1722     explanation: ''
1723     tags: ''
1724     version:
1725       date: '2024-07-23'
1726       number: v3.5.0
1727 - $id: v3.5.0-Draft
1728   $schema: schema.json
1729   abbrev: grpo
1730   attributes:
1731 - deprecated: false
1732   description: ID that is used as an unique designation for a group_offering at
1733     one location (university)
1734   enum: null
1735   format: ''
1736   pattern: .*
1737   title: grpo_id
1738   type: string
1739   x-aisb-dbms-attr:
1740     check: ''
1741     collate: ''
1742     default: ''
1743     fk: ''
1744     generatedValue: ''
1745     notNull: true
1746     pk: true
1747     size: null
1748     specialType: string
1749     unique: false
1750   x-aisb-doc-attr:
1751     comments: The unique designation used does not change over time.
1752     constraints: ''
1753     entities: ''
1754     explanation: ''
1755   jointRespAggre:
1756     de: ''

```

```

1757     en: ''
1758     label: Group Offering ID
1759     tags: ''
1760     unique_id: ''
1761     version:
1762       created:
1763         authors: RMS/BUW
1764         date: '2024-07-23'
1765         number: v3.5.0
1766       updated:
1767         authors: ''
1768         date: null
1769         number: ''
1770     virtual: false
1771 - deprecated: false
1772     description: Long (and short if available) name of the group offered
1773     enum: null
1774     format: ''
1775     pattern: ''
1776     title: grpo_name
1777     type: '#LocalizedName'
1778     x-aisb-dbms-attr:
1779       check: ''
1780       collate: ''
1781       default: ''
1782       fk: ''
1783       generatedValue: ''
1784       notNull: true
1785       pk: false
1786       size: null
1787       specialType: '#LocalizedName'
1788       unique: false
1789     x-aisb-doc-attr:
1790       comments: ''
1791       constraints: ''
1792       entities: ''
1793       explanation: ''
1794       jointRespAggre:
1795         de: ''
1796         en: ''
1797     label: Name of group offering
1798     tags: ''
1799     unique_id: ''
1800     version:
1801       created:
1802         authors: RMS/BUW
1803         date: '2024-07-23'
1804         number: v3.5.0
1805       updated:
1806         authors: ''
1807         date: null
1808         number: ''
1809     virtual: false
1810 - deprecated: false
1811     description: Name of instructor(s) teaching the offered group
1812     enum: null
1813     format: ''
1814     pattern: ''
1815     title: grpo_instructors
1816     type: string[]
1817     x-aisb-dbms-attr:
1818       check: ''
1819       collate: ''

```

```

1820     default: ''
1821     fk: ''
1822     generatedValue: ''
1823     notNull: false
1824     pk: false
1825     size: null
1826     specialType: string[]
1827     unique: false
1828 x-aisb-doc-attr:
1829     comments: ''
1830     constraints: ''
1831     entities: ''
1832     explanation: ''
1833     jointRespAggre:
1834         de: ''
1835         en: ''
1836     label: Instructors of group offering
1837     tags: ''
1838     unique_id: ''
1839     version:
1840         created:
1841             authors: RMS/BUW
1842             date: '2024-07-23'
1843             number: v3.5.0
1844         updated:
1845             authors: ''
1846             date: null
1847             number: ''
1848     virtual: false
1849 - deprecated: false
1850     description: Different events which are offered in relation to the group offering
1851     enum: null
1852     format: ''
1853     pattern: ''
1854     title: grpo_events
1855     type: '#Event[]'
1856 x-aisb-dbms-attr:
1857     check: ''
1858     collate: ''
1859     default: ''
1860     fk: ''
1861     generatedValue: ''
1862     notNull: false
1863     pk: false
1864     size: null
1865     specialType: '#Event[]'
1866     unique: false
1867 x-aisb-doc-attr:
1868     comments: ''
1869     constraints: ''
1870     entities: ''
1871     explanation: ''
1872     jointRespAggre:
1873         de: ''
1874         en: ''
1875     label: List of Events of group offering
1876     tags: ''
1877     unique_id: ''
1878     version:
1879         created:
1880             authors: RMS/BUW
1881             date: '2024-07-23'
1882             number: v3.5.0

```

```

1883         updated:
1884         authors: ''
1885         date: null
1886         number: ''
1887     virtual: false
1888     description: Dimension 'group_offering' of the AIStudyBuddy data model.
1889     title: group_offering
1890     type: object
1891     x-aisb-doc-entity:
1892         comments: ''
1893         constraints: ''
1894         explanation: ''
1895         tags: ''
1896         version:
1897             date: '2024-07-23'
1898             number: v3.5.0
1899 - $id: v3.5.0-Draft
1900 $schema: schema.json
1901 abbrev: modu
1902 attributes:
1903 - deprecated: false
1904   description: ID that is used as an unique designation for a module at one location
1905     (university)
1906   enum: null
1907   format: ''
1908   pattern: .*
1909   title: modu_id
1910   type: string
1911   x-aisb-dbms-attr:
1912       check: ''
1913       collate: ''
1914       default: ''
1915       fk: ''
1916       generatedValue: ''
1917       notNull: true
1918       pk: true
1919       size: null
1920       specialType: string
1921       unique: false
1922   x-aisb-doc-attr:
1923       comments: The unique designation used does not change over time.
1924       constraints: ''
1925       entities: ''
1926       explanation: ''
1927       jointRespAggre:
1928           de: ''
1929           en: ''
1930       label: Module ID
1931       tags: ''
1932       unique_id: ''
1933       version:
1934           created:
1935               authors: RMS/BUW
1936               date: '2024-07-23'
1937               number: v3.5.0
1938           updated:
1939               authors: ''
1940               date: null
1941               number: ''
1942       virtual: false
1943 - deprecated: false
1944   description: Relationship between entities that shows in which examination regulations
1945     the module in question is included.

```

```

1946     enum: null
1947     format: ''
1948     pattern: ''
1949     title: modu_regu_ids
1950     type: string[]
1951     x-aisb-dbms-attr:
1952         check: ''
1953         collate: ''
1954         default: ''
1955         fk: regulation.regu_id
1956         generatedValue: ''
1957         notNull: true
1958         pk: false
1959         size: null
1960         specialType: string[]
1961         unique: false
1962     x-aisb-doc-attr:
1963         comments: ''
1964         constraints: ''
1965         entities: ''
1966         explanation: ''
1967         jointRespAggre:
1968             de: ''
1969             en: ''
1970         label: Regulation IDs
1971         tags: ''
1972         unique_id: ''
1973         version:
1974             created:
1975                 authors: RMS/BUW
1976                 date: '2024-07-23'
1977                 number: v3.5.0
1978             updated:
1979                 authors: PP/BUW
1980                 date: '2024-10-29'
1981                 number: v.3.5.2
1982         virtual: false
1983 - deprecated: false
1984     description: Areas in which the module is included.
1985     enum: null
1986     format: ''
1987     pattern: ''
1988     title: modu_area_ids
1989     type: string[]
1990     x-aisb-dbms-attr:
1991         check: ''
1992         collate: ''
1993         default: ''
1994         fk: area.area_id
1995         generatedValue: ''
1996         notNull: true
1997         pk: false
1998         size: null
1999         specialType: string[]
2000         unique: false
2001     x-aisb-doc-attr:
2002         comments: ''
2003         constraints: ''
2004         entities: ''
2005         explanation: ''
2006         jointRespAggre:
2007             de: ''
2008             en: ''

```

```

2009     label: List of Area IDs
2010     tags: ''
2011     unique_id: ''
2012     version:
2013         created:
2014             authors: RMS/BUW
2015             date: '2024-07-23'
2016             number: v3.5.0
2017         updated:
2018             authors: PP/BUW
2019             date: '2024-10-29'
2020             number: v.3.5.2
2021     virtual: false
2022 - deprecated: false
2023     description: Long (and short if available) name of the module.
2024     enum: null
2025     format: ''
2026     pattern: ''
2027     title: modu_name
2028     type: '#LocalizedName'
2029     x-aisb-dbms-attr:
2030         check: ''
2031         collate: ''
2032         default: ''
2033         fk: ''
2034         generatedValue: ''
2035         notNull: true
2036         pk: false
2037         size: null
2038         specialType: '#LocalizedName'
2039         unique: false
2040     x-aisb-doc-attr:
2041         comments: ''
2042         constraints: ''
2043         entities: ''
2044         explanation: ''
2045         jointRespAggre:
2046             de: ''
2047             en: ''
2048     label: Name of the module
2049     tags: ''
2050     unique_id: ''
2051     version:
2052         created:
2053             authors: RMS/BUW
2054             date: '2024-07-23'
2055             number: v3.5.0
2056         updated:
2057             authors: ''
2058             date: null
2059             number: ''
2060     virtual: false
2061 - deprecated: false
2062     description: Module is valid from this date on.
2063     enum: null
2064     format: yyyy-mm-dd
2065     pattern: (d{4}-dd-dd)?
2066     title: modu_valid_from
2067     type: date
2068     x-aisb-dbms-attr:
2069         check: ''
2070         collate: ''
2071         default: ''

```

```

2072     fk: ''
2073     generatedValue: ''
2074     notNull: true
2075     pk: false
2076     size: null
2077     specialType: date
2078     unique: false
2079 x-aisb-doc-attr:
2080     comments: ''
2081     constraints: ''
2082     entities: ''
2083     explanation: ''
2084     jointRespAggre:
2085         de: ''
2086         en: ''
2087     label: Date from validity
2088     tags: ''
2089     unique_id: ''
2090     version:
2091         created:
2092             authors: RMS/BUW
2093             date: '2024-07-23'
2094             number: v3.5.0
2095         updated:
2096             authors: ''
2097             date: null
2098             number: ''
2099     virtual: false
2100 - deprecated: false
2101     description: Module is deprecated since this date.
2102     enum: null
2103     format: yyyy-mm-dd
2104     pattern: (d{4}-dd-dd)?
2105     title: modu_valid_until
2106     type: date
2107 x-aisb-dbms-attr:
2108     check: ''
2109     collate: ''
2110     default: ''
2111     fk: ''
2112     generatedValue: ''
2113     notNull: true
2114     pk: false
2115     size: null
2116     specialType: date
2117     unique: false
2118 x-aisb-doc-attr:
2119     comments: ''
2120     constraints: ''
2121     entities: ''
2122     explanation: ''
2123     jointRespAggre:
2124         de: ''
2125         en: ''
2126     label: Date since invalidity
2127     tags: ''
2128     unique_id: ''
2129     version:
2130         created:
2131             authors: RMS/BUW
2132             date: '2024-07-23'
2133             number: v3.5.0
2134         updated:

```



```

2135         authors: ''
2136         date: null
2137         number: ''
2138         virtual: false
2139 - deprecated: false
2140         description: Number of semesters over which the module extends.
2141         enum: null
2142         format: ''
2143         pattern: d*
2144         title: modu_term_length
2145         type: integer
2146         x-aisb-dbms-attr:
2147             check: ''
2148             collate: ''
2149             default: ''
2150             fk: ''
2151             generatedValue: ''
2152             notNull: false
2153             pk: false
2154             size: null
2155             specialType: integer
2156             unique: false
2157         x-aisb-doc-attr:
2158             comments: ''
2159             constraints: ''
2160             entities: ''
2161             explanation: ''
2162             jointRespAggre:
2163                 de: ''
2164                 en: ''
2165             label: Duration of the module
2166             tags: ''
2167             unique_id: ''
2168             version:
2169                 created:
2170                     authors: RMS/BUW
2171                     date: '2024-07-23'
2172                     number: v3.5.0
2173                 updated:
2174                     authors: ''
2175                     date: null
2176                     number: ''
2177             virtual: false
2178 - deprecated: false
2179         description: Maximum number of failed attempts in relation to the final examination
2180           of the module.
2181         enum: null
2182         format: ''
2183         pattern: '[0-2]{0,1}'
2184         title: modu_max_failures
2185         type: integer
2186         x-aisb-dbms-attr:
2187             check: ''
2188             collate: ''
2189             default: ''
2190             fk: ''
2191             generatedValue: ''
2192             notNull: true
2193             pk: false
2194             size: null
2195             specialType: integer
2196             unique: false
2197         x-aisb-doc-attr:

```

```

2198     comments: ''
2199     constraints: ''
2200     entities: ''
2201     explanation: ''
2202     jointRespAggre:
2203         de: ''
2204         en: ''
2205     label: Maximum number of failed attempts
2206     tags: ''
2207     unique_id: ''
2208     version:
2209         created:
2210             authors: RMS/BUW
2211             date: '2024-07-23'
2212             number: v3.5.0
2213         updated:
2214             authors: ''
2215             date: null
2216             number: ''
2217     virtual: false
2218 - deprecated: false
2219     description: Credit points to be earned as part of the module.
2220     enum: null
2221     format: ''
2222     pattern: (d+(.d+)?)?
2223     title: modu_credit_points
2224     type: float
2225     x-aisb-dbms-attr:
2226         check: ''
2227         collate: ''
2228         default: ''
2229         fk: ''
2230         generatedValue: ''
2231         notNull: true
2232         pk: false
2233         size: null
2234         specialType: float
2235         unique: false
2236     x-aisb-doc-attr:
2237         comments: ''
2238         constraints: ''
2239         entities: ''
2240         explanation: ''
2241         jointRespAggre:
2242             de: ''
2243             en: ''
2244         label: Credit points of the module
2245         tags: ''
2246         unique_id: ''
2247         version:
2248             created:
2249                 authors: RMS/BUW
2250                 date: '2024-07-23'
2251                 number: v3.5.0
2252             updated:
2253                 authors: PP/BUW
2254                 date: '2024-10-16'
2255                 number: v3.5.1
2256         virtual: false
2257 - deprecated: false
2258     description: Number of weekly working hours of the module.
2259     enum: null
2260     format: ''

```

```

2261     pattern: d*
2262     title: modu_sws
2263     type: integer
2264     x-aisb-dbms-attr:
2265         check: ''
2266         collate: ''
2267         default: ''
2268         fk: ''
2269         generatedValue: ''
2270         notNull: false
2271         pk: false
2272         size: null
2273         specialType: integer
2274         unique: false
2275     x-aisb-doc-attr:
2276         comments: ''
2277         constraints: ''
2278         entities: ''
2279         explanation: ''
2280         jointRespAggre:
2281             de: ''
2282             en: ''
2283         label: Weekly working hours of the module
2284         tags: ''
2285         unique_id: ''
2286         version:
2287             created:
2288                 authors: RMS/BUW
2289                 date: '2024-07-23'
2290                 number: v3.5.0
2291             updated:
2292                 authors: ''
2293                 date: null
2294                 number: ''
2295         virtual: false
2296 - deprecated: false
2297     description: ''
2298     enum: null
2299     format: ''
2300     pattern: ''
2301     title: modu_tags
2302     type: '#Tags'
2303     x-aisb-dbms-attr:
2304         check: ''
2305         collate: ''
2306         default: ''
2307         fk: ''
2308         generatedValue: ''
2309         notNull: false
2310         pk: false
2311         size: null
2312         specialType: '#Tags'
2313         unique: false
2314     x-aisb-doc-attr:
2315         comments: ''
2316         constraints: ''
2317         entities: ''
2318         explanation: ''
2319         jointRespAggre:
2320             de: ''
2321             en: ''
2322         label: ''
2323         tags: ''

```

```

2324     unique_id: ''
2325     version:
2326         created:
2327             authors: RMS/BUW
2328             date: '2024-07-23'
2329             number: v3.5.0
2330         updated:
2331             authors: ''
2332             date: null
2333             number: ''
2334     virtual: false
2335 - deprecated: false
2336     description: Conditions and requirements for the module.
2337     enum: null
2338     format: ''
2339     pattern: ''
2340     title: modu_requirements
2341     type: '#Requirements'
2342     x-aisb-dbms-attr:
2343         check: ''
2344         collate: ''
2345         default: ''
2346         fk: ''
2347         generatedValue: ''
2348         notNull: false
2349         pk: false
2350         size: null
2351         specialType: '#Requirements'
2352         unique: false
2353     x-aisb-doc-attr:
2354         comments: ''
2355         constraints: ''
2356         entities: ''
2357         explanation: ''
2358         jointRespAggre:
2359             de: ''
2360             en: ''
2361         label: Requirements of the module
2362         tags: ''
2363         unique_id: ''
2364         version:
2365             created:
2366                 authors: RMS/BUW
2367                 date: '2024-07-23'
2368                 number: v3.5.0
2369             updated:
2370                 authors: ''
2371                 date: null
2372                 number: ''
2373         virtual: false
2374 - deprecated: false
2375     description: The total number of working hours needed for the module.
2376     enum: null
2377     format: ''
2378     pattern: ''
2379     title: modu_total_workload
2380     type: float
2381     x-aisb-dbms-attr:
2382         check: ''
2383         collate: ''
2384         default: ''
2385         fk: ''
2386         generatedValue: ''

```

```

2387     notNull: false
2388     pk: false
2389     size: null
2390     specialType: float
2391     unique: false
2392     x-aisb-doc-attr:
2393       comments: ''
2394       constraints: ''
2395       entities: ''
2396       explanation: ''
2397       jointRespAggre:
2398         de: ''
2399         en: ''
2400       label: Total working hours of the module
2401       tags: ''
2402       unique_id: ''
2403       version:
2404         created:
2405           authors: TJ/RWTH
2406           date: '2024-10-24'
2407           number: V3.5.2
2408         updated:
2409           authors: ''
2410           date: null
2411           number: ''
2412       virtual: false
2413     - deprecated: false
2414     description: The natural language description of the module taken from the module
2415       handbook.
2416     enum: null
2417     format: ''
2418     pattern: ''
2419     title: modu_description
2420     type: '#LocalizedString'
2421     x-aisb-dbms-attr:
2422       check: ''
2423       collate: ''
2424       default: ''
2425       fk: ''
2426       generatedValue: ''
2427       notNull: false
2428       pk: false
2429       size: null
2430       specialType: '#LocalizedString'
2431       unique: false
2432     x-aisb-doc-attr:
2433       comments: ''
2434       constraints: ''
2435       entities: ''
2436       explanation: ''
2437       jointRespAggre:
2438         de: ''
2439         en: ''
2440       label: Natural language description of the module
2441       tags: ''
2442       unique_id: ''
2443       version:
2444         created:
2445           authors: TJ/RWTH
2446           date: '2024-10-24'
2447           number: V3.5.2
2448         updated:
2449           authors: ''

```

```

2450         date: null
2451         number: ''
2452     virtual: false
2453 - deprecated: false
2454     description: The assessment method used in the examination of the module.
2455     enum: null
2456     format: ''
2457     pattern: ''
2458     title: modu_assessment_mode
2459     type: '#LocalizedString'
2460     x-aisb-dbms-attr:
2461         check: ''
2462         collate: ''
2463         default: ''
2464         fk: ''
2465         generatedValue: ''
2466         notNull: false
2467         pk: false
2468         size: null
2469         specialType: '#LocalizedString'
2470         unique: false
2471     x-aisb-doc-attr:
2472         comments: ''
2473         constraints: ''
2474         entities: ''
2475         explanation: ''
2476         jointRespAggre:
2477             de: ''
2478             en: ''
2479         label: Kind of assessment used for the module
2480         tags: ''
2481         unique_id: ''
2482         version:
2483             created:
2484                 authors: TJ/RWTH
2485                 date: '2024-10-24'
2486                 number: V3.5.2
2487             updated:
2488                 authors: ''
2489                 date: null
2490                 number: ''
2491     virtual: false
2492 - deprecated: false
2493     description: The learning targets of the module taken from the module handbook.
2494     enum: null
2495     format: ''
2496     pattern: ''
2497     title: modu_learning_targets
2498     type: '#LocalizedString'
2499     x-aisb-dbms-attr:
2500         check: ''
2501         collate: ''
2502         default: ''
2503         fk: ''
2504         generatedValue: ''
2505         notNull: false
2506         pk: false
2507         size: null
2508         specialType: '#LocalizedString'
2509         unique: false
2510     x-aisb-doc-attr:
2511         comments: ''
2512         constraints: ''

```

```

2513     entities: ''
2514     explanation: ''
2515     jointRespAggre:
2516         de: ''
2517         en: ''
2518     label: Learning targets of the module
2519     tags: ''
2520     unique_id: ''
2521     version:
2522         created:
2523             authors: TJ/RWTH
2524             date: '2024-10-24'
2525             number: V3.5.2
2526         updated:
2527             authors: ''
2528             date: null
2529             number: ''
2530     virtual: false
2531 - deprecated: false
2532     description: The teaching methods of the module taken from the module handbook
2533     enum: null
2534     format: ''
2535     pattern: ''
2536     title: modu_teaching_methods
2537     type: '#LocalizedString'
2538     x-aisb-dbms-attr:
2539         check: ''
2540         collate: ''
2541         default: ''
2542         fk: ''
2543         generatedValue: ''
2544         notNull: false
2545         pk: false
2546         size: null
2547         specialType: '#LocalizedString'
2548         unique: false
2549     x-aisb-doc-attr:
2550         comments: ''
2551         constraints: ''
2552         entities: ''
2553         explanation: ''
2554         jointRespAggre:
2555             de: ''
2556             en: ''
2557     label: Teaching methods of the module
2558     tags: ''
2559     unique_id: ''
2560     version:
2561         created:
2562             authors: TJ/RWTH
2563             date: '2024-10-24'
2564             number: V3.5.2
2565         updated:
2566             authors: ''
2567             date: null
2568             number: ''
2569     virtual: false
2570     description: Dimension 'module' of the AIStudyBuddy data model.
2571     title: module
2572     type: object
2573     x-aisb-doc-entity:
2574         comments: ''
2575         constraints: ''

```

```

2576     explanation: ''
2577     tags: ''
2578     version:
2579         date: '2024-07-23'
2580         number: v3.5.0
2581 - $id: v3.5.0-Draft
2582 $schema: schema.json
2583 abbrev: moco
2584 attributes:
2585 - deprecated: false
2586   description: Relationship between entities that shows in which modules a component
2587     is listed.
2588   enum: null
2589   format: ''
2590   pattern: ''
2591   title: moco_modu_id
2592   type: ''
2593   x-aisb-dbms-attr:
2594       check: ''
2595       collate: ''
2596       default: ''
2597       fk: module.modu_id
2598       generatedValue: ''
2599       notNull: true
2600       pk: true
2601       size: null
2602       specialType: ''
2603       unique: false
2604   x-aisb-doc-attr:
2605       comments: ''
2606       constraints: ''
2607       entities: ''
2608       explanation: ''
2609       jointRespAggre:
2610         de: ''
2611         en: ''
2612       label: Module ID
2613       tags: ''
2614       unique_id: ''
2615       version:
2616         created:
2617             authors: RMS/BUW
2618             date: '2024-07-23'
2619             number: v3.5.0
2620         updated:
2621             authors: ''
2622             date: null
2623             number: ''
2624       virtual: false
2625 - deprecated: false
2626   description: Relationship between entities that shows which components a module
2627     consists of.
2628   enum: null
2629   format: ''
2630   pattern: ''
2631   title: moco_comp_id
2632   type: ''
2633   x-aisb-dbms-attr:
2634       check: ''
2635       collate: ''
2636       default: ''
2637       fk: component.comp_id
2638       generatedValue: ''

```



```

2639     notNull: true
2640     pk: true
2641     size: null
2642     specialType: ''
2643     unique: false
2644     x-aisb-doc-attr:
2645       comments: ''
2646       constraints: ''
2647       entities: ''
2648       explanation: ''
2649       jointRespAggre:
2650         de: ''
2651         en: ''
2652       label: Component ID
2653       tags: ''
2654       unique_id: ''
2655       version:
2656         created:
2657           authors: RMS/BUW
2658           date: '2024-07-23'
2659           number: v3.5.0
2660         updated:
2661           authors: ''
2662           date: null
2663           number: ''
2664       virtual: false
2665   - deprecated: false
2666     description: Number of attempts
2667     enum: null
2668     format: ''
2669     pattern: d*
2670     title: moco_free_trials
2671     type: integer
2672     x-aisb-dbms-attr:
2673       check: ''
2674       collate: ''
2675       default: ''
2676       fk: ''
2677       generatedValue: ''
2678       notNull: true
2679       pk: false
2680       size: null
2681       specialType: integer
2682       unique: false
2683     x-aisb-doc-attr:
2684       comments: ''
2685       constraints: ''
2686       entities: ''
2687       explanation: ''
2688       jointRespAggre:
2689         de: ''
2690         en: ''
2691       label: Number of free trials
2692       tags: ''
2693       unique_id: ''
2694       version:
2695         created:
2696           authors: RMS/BUW
2697           date: '2024-07-23'
2698           number: v3.5.0
2699         updated:
2700           authors: ''
2701           date: null

```

```

2702         number: ''
2703     virtual: false
2704 - deprecated: false
2705     description: The relative offset in which the module is placed, depending on the
2706         module. If it is the same semester, this value is zero.
2707     enum: null
2708     format: ''
2709     pattern: d*
2710     title: moco_relative_term
2711     type: integer
2712     x-aisb-dbms-attr:
2713         check: ''
2714         collate: ''
2715         default: ''
2716         fk: ''
2717         generatedValue: ''
2718         notNull: false
2719         pk: false
2720         size: null
2721         specialType: integer
2722         unique: false
2723     x-aisb-doc-attr:
2724         comments: ''
2725         constraints: ''
2726         entities: ''
2727         explanation: ''
2728         jointRespAggre:
2729             de: ''
2730             en: ''
2731         label: Relative term offset to the module
2732         tags: ''
2733         unique_id: ''
2734         version:
2735             created:
2736                 authors: RMS/BUW
2737                 date: '2024-07-23'
2738                 number: v3.5.0
2739             updated:
2740                 authors: ''
2741                 date: null
2742                 number: ''
2743         virtual: false
2744 - deprecated: false
2745     description: Credit points to be earned as part of the module component.
2746     enum: null
2747     format: ''
2748     pattern: (d+(.d+)?)?
2749     title: moco_credit_points
2750     type: float
2751     x-aisb-dbms-attr:
2752         check: ''
2753         collate: ''
2754         default: ''
2755         fk: ''
2756         generatedValue: ''
2757         notNull: false
2758         pk: false
2759         size: null
2760         specialType: float
2761         unique: false
2762     x-aisb-doc-attr:
2763         comments: ''
2764         constraints: ''

```

```

2765     entities: ''
2766     explanation: ''
2767     jointRespAggre:
2768         de: ''
2769         en: ''
2770     label: Credit points of the module component
2771     tags: ''
2772     unique_id: ''
2773     version:
2774         created:
2775             authors: RMS/BUW
2776             date: '2024-07-23'
2777             number: v3.5.0
2778         updated:
2779             authors: PP/BUW
2780             date: '2024-10-16'
2781             number: v3.5.1
2782     virtual: false
2783 - deprecated: false
2784     description: Number of weekly working hours of the module component.
2785     enum: null
2786     format: ''
2787     pattern: d*
2788     title: moco_sws
2789     type: integer
2790     x-aisb-dbms-attr:
2791         check: ''
2792         collate: ''
2793         default: ''
2794         fk: ''
2795         generatedValue: ''
2796         notNull: false
2797         pk: false
2798         size: null
2799         specialType: integer
2800         unique: false
2801     x-aisb-doc-attr:
2802         comments: ''
2803         constraints: ''
2804         entities: ''
2805         explanation: ''
2806         jointRespAggre:
2807             de: ''
2808             en: ''
2809         label: Weekly working hours
2810         tags: ''
2811         unique_id: ''
2812         version:
2813             created:
2814                 authors: RMS/BUW
2815                 date: '2024-07-23'
2816                 number: v3.5.0
2817             updated:
2818                 authors: ''
2819                 date: null
2820                 number: ''
2821         virtual: false
2822 - deprecated: false
2823     description: Conditions and requirements for the module components.
2824     enum: null
2825     format: ''
2826     pattern: ''
2827     title: moco_requirements

```

```

2828     type: '#Requirements'
2829     x-aisb-dbms-attr:
2830       check: ''
2831       collate: ''
2832       default: ''
2833       fk: ''
2834       generatedValue: ''
2835       notNull: false
2836       pk: false
2837       size: null
2838       specialType: '#Requirements'
2839       unique: false
2840     x-aisb-doc-attr:
2841       comments: ''
2842       constraints: ''
2843       entities: ''
2844       explanation: ''
2845       jointRespAggre:
2846         de: ''
2847         en: ''
2848       label: Requirements of the module component
2849       tags: ''
2850       unique_id: ''
2851       version:
2852         created:
2853           authors: RMS/BUW
2854           date: '2024-07-23'
2855           number: v3.5.0
2856         updated:
2857           authors: ''
2858           date: null
2859           number: ''
2860       virtual: false
2861   - deprecated: false
2862     description: Marks this module component as compulsory.
2863     enum: null
2864     format: ''
2865     pattern: ([01])?
2866     title: moco_is_compulsory
2867     type: boolean
2868     x-aisb-dbms-attr:
2869       check: ''
2870       collate: ''
2871       default: ''
2872       fk: ''
2873       generatedValue: ''
2874       notNull: true
2875       pk: false
2876       size: null
2877       specialType: boolean
2878       unique: false
2879     x-aisb-doc-attr:
2880       comments: ''
2881       constraints: ''
2882       entities: ''
2883       explanation: ''
2884       jointRespAggre:
2885         de: ''
2886         en: ''
2887       label: Flag of obligation
2888       tags: ''
2889       unique_id: ''
2890       version:

```

```

2891         created:
2892             authors: RMS/BUW
2893             date: '2024-07-23'
2894             number: v3.5.0
2895         updated:
2896             authors: ''
2897             date: null
2898             number: ''
2899         virtual: false
2900     description: Dimension 'module_component' of the AIStudyBuddy data model.
2901     title: module_component
2902     type: object
2903     x-aisb-doc-entity:
2904         comments: ''
2905         constraints: ''
2906         explanation: ''
2907         tags: ''
2908         version:
2909             date: '2024-07-23'
2910             number: v3.5.0
2911 - $id: v3.5.0-Draft
2912   $schema: schema.json
2913   abbrev: plac
2914   attributes:
2915   - deprecated: false
2916     description: ID that is used as an unique designation for a placeholder_module
2917       at one location (university)
2918     enum: null
2919     format: ''
2920     pattern: .*
2921     title: plac_id
2922     type: string
2923     x-aisb-dbms-attr:
2924         check: ''
2925         collate: ''
2926         default: ''
2927         fk: ''
2928         generatedValue: ''
2929         notNull: true
2930         pk: true
2931         size: null
2932         specialType: string
2933         unique: false
2934     x-aisb-doc-attr:
2935         comments: The unique designation used does not change over time.
2936         constraints: ''
2937         entities: ''
2938         explanation: ''
2939         jointRespAggre:
2940             de: ''
2941             en: ''
2942         label: Placeholder module ID
2943         tags: ''
2944         unique_id: ''
2945         version:
2946             created:
2947                 authors: RMS/BUW
2948                 date: '2024-07-23'
2949                 number: v3.5.0
2950             updated:
2951                 authors: ''
2952                 date: null
2953                 number: ''

```

```

2954     virtual: false
2955 - deprecated: false
2956 description: ''
2957 enum: null
2958 format: ''
2959 pattern: ''
2960 title: plac_area_id
2961 type: ''
2962 x-aisb-dbms-attr:
2963   check: ''
2964   collate: ''
2965   default: ''
2966   fk: area.area_id
2967   generatedValue: ''
2968   notNull: true
2969   pk: false
2970   size: null
2971   specialType: ''
2972   unique: false
2973 x-aisb-doc-attr:
2974   comments: ''
2975   constraints: ''
2976   entities: ''
2977   explanation: ''
2978   jointRespAggre:
2979     de: ''
2980     en: ''
2981 label: Area ID
2982 tags: ''
2983 unique_id: ''
2984 version:
2985   created:
2986     authors: RMS/BUW
2987     date: '2024-07-23'
2988     number: v3.5.0
2989   updated:
2990     authors: ''
2991     date: null
2992     number: ''
2993     virtual: false
2994 - deprecated: false
2995 description: Long (and short if available) name of the placeholder module
2996 enum: null
2997 format: ''
2998 pattern: ''
2999 title: plac_name
3000 type: '#LocalizedName'
3001 x-aisb-dbms-attr:
3002   check: ''
3003   collate: ''
3004   default: ''
3005   fk: ''
3006   generatedValue: ''
3007   notNull: true
3008   pk: false
3009   size: null
3010   specialType: '#LocalizedName'
3011   unique: false
3012 x-aisb-doc-attr:
3013   comments: ''
3014   constraints: ''
3015   entities: ''
3016   explanation: ''

```

```

3017     jointRespAggre:
3018         de: ''
3019         en: ''
3020     label: Name of the placeholder module
3021     tags: ''
3022     unique_id: ''
3023     version:
3024         created:
3025             authors: RMS/BUW
3026             date: '2024-07-23'
3027             number: v3.5.0
3028         updated:
3029             authors: ''
3030             date: null
3031             number: ''
3032     virtual: false
3033 - deprecated: false
3034     description: Credit points that are planned to be assigned to the placeholder
3035     module
3036     enum: null
3037     format: ''
3038     pattern: (d+(.d+)?)?
3039     title: plac_credit_points
3040     type: float
3041     x-aisb-dbms-attr:
3042         check: ''
3043         collate: ''
3044         default: ''
3045         fk: ''
3046         generatedValue: ''
3047         notNull: true
3048         pk: false
3049         size: null
3050         specialType: float
3051         unique: false
3052     x-aisb-doc-attr:
3053         comments: ''
3054         constraints: ''
3055         entities: ''
3056         explanation: ''
3057     jointRespAggre:
3058         de: ''
3059         en: ''
3060     label: Credit points of the placeholder module
3061     tags: ''
3062     unique_id: ''
3063     version:
3064         created:
3065             authors: RMS/BUW
3066             date: '2024-07-23'
3067             number: v3.5.0
3068         updated:
3069             authors: PP/BUW
3070             date: '2024-10-16'
3071             number: v3.5.1
3072     virtual: false
3073 - deprecated: false
3074     description: Duration (in terms) the placeholder module is supposed to take.
3075     enum: null
3076     format: ''
3077     pattern: d*
3078     title: plac_duration
3079     type: integer

```

```

3080     x-aisb-dbms-attr:
3081         check: ''
3082         collate: ''
3083         default: ''
3084         fk: ''
3085         generatedValue: ''
3086         notNull: true
3087         pk: false
3088         size: null
3089         specialType: integer
3090         unique: false
3091     x-aisb-doc-attr:
3092         comments: In most cases, this will be 1
3093         constraints: ''
3094         entities: ''
3095         explanation: ''
3096         jointRespAggre:
3097             de: ''
3098             en: ''
3099         label: Duration of the placeholder module
3100         tags: ''
3101         unique_id: ''
3102         version:
3103             created:
3104                 authors: RMS/BUW
3105                 date: '2024-07-23'
3106                 number: v3.5.0
3107             updated:
3108                 authors: ''
3109                 date: null
3110                 number: ''
3111         virtual: false
3112     description: "Dimension 'placeholder_module\u2019 of the AIStudyBuddy data model."
3113     title: placeholder_module
3114     type: object
3115     x-aisb-doc-entity:
3116         comments: ''
3117         constraints: ''
3118         explanation: ''
3119         tags: ''
3120         version:
3121             date: '2024-07-23'
3122             number: v3.5.0
3123 - $id: v3.5.0-Draft
3124 $schema: schema.json
3125 abbrev: plmo
3126 attributes:
3127 - deprecated: false
3128   description: ID that is used as an unique designation for a plan_module at one
3129     location (university)
3130   enum: null
3131   format: ''
3132   pattern: .*
3133   title: plmo_id
3134   type: string
3135   x-aisb-dbms-attr:
3136       check: ''
3137       collate: ''
3138       default: ''
3139       fk: ''
3140       generatedValue: ''
3141       notNull: true
3142       pk: true

```



```

3143     size: null
3144     specialType: string
3145     unique: false
3146   x-aisb-doc-attr:
3147     comments: The unique designation used does not change over time.
3148     constraints: ''
3149     entities: ''
3150     explanation: ''
3151     jointRespAggre:
3152       de: ''
3153       en: ''
3154     label: Plan module ID
3155     tags: ''
3156     unique_id: ''
3157     version:
3158       created:
3159         authors: RMS/BUW
3160         date: '2024-07-23'
3161         number: v3.5.0
3162       updated:
3163         authors: ''
3164         date: null
3165         number: ''
3166     virtual: false
3167   - deprecated: false
3168     description: ''
3169     enum: null
3170     format: ''
3171     pattern: ''
3172     title: plmo_placeholder_id
3173     type: ''
3174   x-aisb-dbms-attr:
3175     check: ''
3176     collate: ''
3177     default: ''
3178     fk: placeholder_module.plac_id
3179     generatedValue: ''
3180     notNull: true
3181     pk: false
3182     size: null
3183     specialType: ''
3184     unique: false
3185   x-aisb-doc-attr:
3186     comments: ''
3187     constraints: ''
3188     entities: ''
3189     explanation: ''
3190     jointRespAggre:
3191       de: ''
3192       en: ''
3193     label: Placeholder module ID
3194     tags: ''
3195     unique_id: ''
3196     version:
3197       created:
3198         authors: RMS/BUW
3199         date: '2024-07-23'
3200         number: v3.5.0
3201       updated:
3202         authors: ''
3203         date: null
3204         number: ''
3205     virtual: false

```

```

3206 - deprecated: false
3207   description: ''
3208   enum: null
3209   format: ''
3210   pattern: ''
3211   title: plmo_comp_id
3212   type: ''
3213   x-aisb-dbms-attr:
3214     check: ''
3215     collate: ''
3216     default: ''
3217     fk: component.comp_id
3218     generatedValue: ''
3219     notNull: true
3220     pk: false
3221     size: null
3222     specialType: ''
3223     unique: false
3224   x-aisb-doc-attr:
3225     comments: ''
3226     constraints: ''
3227     entities: ''
3228     explanation: ''
3229     jointRespAggre:
3230       de: ''
3231       en: ''
3232     label: Component ID
3233     tags: ''
3234     unique_id: ''
3235     version:
3236       created:
3237         authors: RMS/BUW
3238         date: '2024-07-23'
3239         number: v3.5.0
3240       updated:
3241         authors: PP/BUW
3242         date: '2024-10-16'
3243         number: v3.5.1
3244     virtual: false
3245 - deprecated: false
3246   description: ''
3247   enum: null
3248   format: ''
3249   pattern: ''
3250   title: plmo_modu_id
3251   type: ''
3252   x-aisb-dbms-attr:
3253     check: ''
3254     collate: ''
3255     default: ''
3256     fk: module.modu_id
3257     generatedValue: ''
3258     notNull: true
3259     pk: false
3260     size: null
3261     specialType: ''
3262     unique: false
3263   x-aisb-doc-attr:
3264     comments: ''
3265     constraints: ''
3266     entities: ''
3267     explanation: ''
3268     jointRespAggre:

```

```

3269     de: ''
3270     en: ''
3271     label: Module ID
3272     tags: ''
3273     unique_id: ''
3274     version:
3275         created:
3276             authors: RMS/BUW
3277             date: '2024-07-23'
3278             number: v3.5.0
3279         updated:
3280             authors: ''
3281             date: null
3282             number: ''
3283     virtual: false
3284 - deprecated: false
3285     description: The semester specified in the start plan in which the module should
3286     be taken.
3287     enum: null
3288     format: ''
3289     pattern: d*
3290     title: plmo_term
3291     type: integer
3292     x-aisb-dbms-attr:
3293         check: ''
3294         collate: ''
3295         default: ''
3296         fk: ''
3297         generatedValue: ''
3298         notNull: true
3299         pk: false
3300         size: null
3301         specialType: integer
3302         unique: false
3303     x-aisb-doc-attr:
3304         comments: We count from zero, so first semester is zero.
3305         constraints: ''
3306         entities: ''
3307         explanation: ''
3308         jointRespAggre:
3309             de: ''
3310             en: ''
3311         label: Term indicated
3312         tags: ''
3313         unique_id: ''
3314         version:
3315             created:
3316                 authors: RMS/BUW
3317                 date: '2024-07-23'
3318                 number: v3.5.0
3319             updated:
3320                 authors: ''
3321                 date: null
3322                 number: ''
3323         virtual: false
3324 - deprecated: false
3325     description: ''
3326     enum: null
3327     format: ''
3328     pattern: ''
3329     title: plmo_area_id
3330     type: ''
3331     x-aisb-dbms-attr:

```

```

3332     check: ''
3333     collate: ''
3334     default: ''
3335     fk: area.area_id
3336     generatedValue: ''
3337     notNull: false
3338     pk: false
3339     size: null
3340     specialType: ''
3341     unique: false
3342 x-aisb-doc-attr:
3343     comments: ''
3344     constraints: ''
3345     entities: ''
3346     explanation: ''
3347     jointRespAggre:
3348         de: ''
3349         en: ''
3350     label: Area ID
3351     tags: ''
3352     unique_id: ''
3353     version:
3354         created:
3355             authors: PP/BUW
3356             date: '2024-10-16'
3357             number: v3.5.1
3358         updated:
3359             authors: ''
3360             date: null
3361             number: ''
3362     virtual: false
3363 description: Dimension 'plan_module' of the AISTudyBuddy data model.
3364 title: plan_module
3365 type: object
3366 x-aisb-doc-entity:
3367     comments: ''
3368     constraints: ''
3369     explanation: ''
3370     tags: ''
3371     version:
3372         date: '2024-07-23'
3373         number: v3.5.0
3374 - $id: v3.5.0-Draft
3375 $schema: schema.json
3376 abbrev: regu
3377 attributes:
3378 - deprecated: false
3379 description: Relationship between entities that shows the subject matter of the
3380 examination regulation.
3381 enum: null
3382 format: ''
3383 pattern: ''
3384 title: regu_stpr_id
3385 type: ''
3386 x-aisb-dbms-attr:
3387     check: ''
3388     collate: ''
3389     default: ''
3390     fk: study_program.stpr_id
3391     generatedValue: ''
3392     notNull: true
3393     pk: false
3394     size: null

```

```

3395     specialType: ''
3396     unique: false
3397 x-aisb-doc-attr:
3398     comments: ''
3399     constraints: ''
3400     entities: ''
3401     explanation: ''
3402     jointRespAggre:
3403         de: ''
3404         en: ''
3405     label: Study Program ID
3406     tags: ''
3407     unique_id: ''
3408     version:
3409         created:
3410             authors: RMS/BUW
3411             date: '2024-07-23'
3412             number: v3.5.0
3413         updated:
3414             authors: PP/BUW
3415             date: '2024-10-29'
3416             number: v.3.5.2
3417     virtual: false
3418 - deprecated: false
3419     description: ID that is used as an unique designation for a regulation at one
3420         location (university)
3421     enum: null
3422     format: ''
3423     pattern: .*
3424     title: regu_id
3425     type: string
3426 x-aisb-dbms-attr:
3427     check: ''
3428     collate: ''
3429     default: ''
3430     fk: ''
3431     generatedValue: ''
3432     notNull: true
3433     pk: true
3434     size: null
3435     specialType: string
3436     unique: false
3437 x-aisb-doc-attr:
3438     comments: The unique designation used does not change over time.
3439     constraints: ''
3440     entities: ''
3441     explanation: ''
3442     jointRespAggre:
3443         de: ''
3444         en: ''
3445     label: Regulation ID
3446     tags: ''
3447     unique_id: ''
3448     version:
3449         created:
3450             authors: RMS/BUW
3451             date: '2024-07-23'
3452             number: v3.5.0
3453         updated:
3454             authors: ''
3455             date: null
3456             number: ''
3457     virtual: false

```

```

3458 - deprecated: false
3459   description: Relationship between entities that shows the top knot of the hierarchy
3460     of areas.
3461   enum: null
3462   format: ''
3463   pattern: ''
3464   title: regu_area_id
3465   type: ''
3466   x-aisb-dbms-attr:
3467     check: ''
3468     collate: ''
3469     default: ''
3470     fk: area.area_id
3471     generatedValue: ''
3472     notNull: true
3473     pk: false
3474     size: null
3475     specialType: ''
3476     unique: false
3477   x-aisb-doc-attr:
3478     comments: The hierarchy of the areas is building the technical representation
3479       of an examination regulation.
3480     constraints: ''
3481     entities: ''
3482     explanation: ''
3483     jointRespAggre:
3484       de: ''
3485       en: ''
3486     label: Area ID
3487     tags: ''
3488     unique_id: ''
3489     version:
3490       created:
3491         authors: RMS/BUW
3492         date: '2024-07-23'
3493         number: v3.5.0
3494       updated:
3495         authors: ''
3496         date: null
3497         number: ''
3498     virtual: false
3499 - deprecated: false
3500   description: "All start plans (for the different start terms) of the regulation,\
3501     \ depending on specific goals (e.g. full-time, partial, \u2026)"
3502   enum: null
3503   format: ''
3504   pattern: ''
3505   title: regu_start_plans
3506   type: '#StartPlanMapping'
3507   x-aisb-dbms-attr:
3508     check: ''
3509     collate: ''
3510     default: ''
3511     fk: ''
3512     generatedValue: ''
3513     notNull: false
3514     pk: false
3515     size: null
3516     specialType: '#StartPlanMapping'
3517     unique: false
3518   x-aisb-doc-attr:
3519     comments: ''
3520     constraints: ''

```

```

3521     entities: ''
3522     explanation: ''
3523     jointRespAggre:
3524         de: ''
3525         en: ''
3526     label: Starting plans of the regulation
3527     tags: ''
3528     unique_id: ''
3529     version:
3530         created:
3531             authors: RMS/BUW
3532             date: '2024-07-23'
3533             number: v3.5.0
3534         updated:
3535             authors: ''
3536             date: null
3537             number: ''
3538     virtual: false
3539 - deprecated: false
3540     description: Versions of the regulation that are relevant for the study program.
3541     enum: null
3542     format: ''
3543     pattern: .*
3544     title: regu_version
3545     type: string
3546     x-aisb-dbms-attr:
3547         check: ''
3548         collate: ''
3549         default: ''
3550         fk: ''
3551         generatedValue: ''
3552         notNull: true
3553         pk: false
3554         size: null
3555         specialType: string
3556         unique: false
3557     x-aisb-doc-attr:
3558         comments: ''
3559         constraints: ''
3560         entities: ''
3561         explanation: ''
3562         jointRespAggre:
3563             de: ''
3564             en: ''
3565     label: Version of the regulation
3566     tags: ''
3567     unique_id: ''
3568     version:
3569         created:
3570             authors: RMS/BUW
3571             date: '2024-07-23'
3572             number: v3.5.0
3573         updated:
3574             authors: PP/BUW
3575             date: '2024-10-29'
3576             number: v.3.5.2
3577     virtual: false
3578 - deprecated: false
3579     description: Credit points to be earned as part of the regulation.
3580     enum: null
3581     format: ''
3582     pattern: (d+(.d+)?)?
3583     title: regu_credit_points

```

```

3584     type: float
3585     x-aisb-dbms-attr:
3586         check: ''
3587         collate: ''
3588         default: ''
3589         fk: ''
3590         generatedValue: ''
3591         notNull: true
3592         pk: false
3593         size: null
3594         specialType: float
3595         unique: false
3596     x-aisb-doc-attr:
3597         comments: ''
3598         constraints: ''
3599         entities: ''
3600         explanation: ''
3601         jointRespAggre:
3602             de: ''
3603             en: ''
3604         label: Credits points of the regulation
3605         tags: ''
3606         unique_id: ''
3607         version:
3608             created:
3609                 authors: RMS/BUW
3610                 date: '2024-07-23'
3611                 number: v3.5.0
3612             updated:
3613                 authors: PP/BUW
3614                 date: '2024-10-16'
3615                 number: v3.5.1
3616         virtual: false
3617 - deprecated: false
3618     description: Regulation is valid from this date on.
3619     enum: null
3620     format: yyyy-mm-dd
3621     pattern: (d{4}-dd-dd)?
3622     title: regu_valid_from
3623     type: date
3624     x-aisb-dbms-attr:
3625         check: ''
3626         collate: ''
3627         default: ''
3628         fk: ''
3629         generatedValue: ''
3630         notNull: true
3631         pk: false
3632         size: null
3633         specialType: date
3634         unique: false
3635     x-aisb-doc-attr:
3636         comments: ''
3637         constraints: ''
3638         entities: ''
3639         explanation: ''
3640         jointRespAggre:
3641             de: ''
3642             en: ''
3643         label: Date from validity
3644         tags: ''
3645         unique_id: ''
3646         version:

```



```

3647     created:
3648     authors: RMS/BUW
3649     date: '2024-07-23'
3650     number: v3.5.0
3651     updated:
3652     authors: ''
3653     date: null
3654     number: ''
3655     virtual: false
3656 - deprecated: false
3657 description: Regulation is deprecated since this date.
3658 enum: null
3659 format: yyyy-mm-dd
3660 pattern: (d{4}-dd-dd)?
3661 title: regu_valid_until
3662 type: date
3663 x-aisb-dbms-attr:
3664     check: ''
3665     collate: ''
3666     default: ''
3667     fk: ''
3668     generatedValue: ''
3669     notNull: true
3670     pk: false
3671     size: null
3672     specialType: date
3673     unique: false
3674 x-aisb-doc-attr:
3675     comments: ''
3676     constraints: ''
3677     entities: ''
3678     explanation: ''
3679     jointRespAggre:
3680     de: ''
3681     en: ''
3682 label: Date since invalidity
3683 tags: ''
3684 unique_id: ''
3685 version:
3686     created:
3687     authors: RMS/BUW
3688     date: '2024-07-23'
3689     number: v3.5.0
3690     updated:
3691     authors: ''
3692     date: null
3693     number: ''
3694     virtual: false
3695 description: Dimension 'regulation' of the AIStudyBuddy data model.
3696 title: regulation
3697 type: object
3698 x-aisb-doc-entity:
3699     comments: ''
3700     constraints: ''
3701     explanation: ''
3702     tags: ''
3703     version:
3704     date: '2024-07-23'
3705     number: v3.5.0
3706 - $id: v3.5.0-Draft
3707 $schema: schema.json
3708 abbrev: stud
3709 attributes:

```

```

3710 - deprecated: false
3711   description: A unique identifier assigned by the universities to each person whose
3712     data is stored in the data warehouse. The unique identifier must remain constant
3713     over time
3714   enum: null
3715   format: ''
3716   pattern: .*
3717   title: stud_id
3718   type: string
3719   x-aisb-dbms-attr:
3720     check: ''
3721     collate: ''
3722     default: ''
3723     fk: ''
3724     generatedValue: ''
3725     notNull: true
3726     pk: true
3727     size: null
3728     specialType: string
3729     unique: false
3730   x-aisb-doc-attr:
3731     comments: ''
3732     constraints: ''
3733     entities: ''
3734     explanation: ''
3735     jointRespAggre:
3736       de: ''
3737       en: ''
3738     label: Student ID
3739     tags: ''
3740     unique_id: ix0003
3741     version:
3742       created:
3743         authors: JEF/BUW
3744         date: '2022-07-25'
3745         number: v1.0.0
3746       updated:
3747         authors: RMS/BUW
3748         date: '2024-08-20'
3749         number: v3.5.0
3750     virtual: false
3751 - deprecated: false
3752   description: Reference to the university, at which the student is enrolled
3753   enum: null
3754   format: ''
3755   pattern: ''
3756   title: stud_univ_id
3757   type: ''
3758   x-aisb-dbms-attr:
3759     check: ''
3760     collate: ''
3761     default: ''
3762     fk: university.univ_id
3763     generatedValue: ''
3764     notNull: true
3765     pk: false
3766     size: null
3767     specialType: ''
3768     unique: false
3769   x-aisb-doc-attr:
3770     comments: ''
3771     constraints: ''
3772     entities: ''

```

```

3773     explanation: ''
3774     jointRespAggre:
3775         de: ''
3776         en: ''
3777     label: University ID
3778     tags: ''
3779     unique_id: v0203n007
3780     version:
3781         created:
3782             authors: RMS/BUW
3783             date: '2024-06-06'
3784             number: v3.5.0
3785         updated:
3786             authors: PP/BUW
3787             date: '2024-06-10'
3788             number: v3.5.0
3789     virtual: false
3790 - deprecated: false
3791     description: The gender of the student. Possible values are listed in the enumeration
3792     table
3793     enum:
3794     - description: no record
3795       value: '-'
3796     - description: diverse
3797       value: d
3798     - description: female
3799       value: f
3800     - description: male
3801       value: m
3802     format: ''
3803     pattern: .{0,1}
3804     title: stud_gender
3805     type: character
3806     x-aisb-dbms-attr:
3807         check: ''
3808         collate: ''
3809         default: ''
3810         fk: ''
3811         generatedValue: ''
3812         notNull: true
3813         pk: false
3814         size: null
3815         specialType: character
3816         unique: false
3817     x-aisb-doc-attr:
3818         comments: ''
3819         constraints: ''
3820         entities: ''
3821         explanation: ''
3822         jointRespAggre:
3823             de: ''
3824             en: ''
3825         label: Gender of person
3826         tags: ''
3827         unique_id: ix0004
3828         version:
3829             created:
3830                 authors: JEF/BUW
3831                 date: '2022-07-25'
3832                 number: v1.0.0
3833             updated:
3834                 authors: PP/BUW
3835                 date: '2024-10-16'

```

```

3836         number: v3.5.1
3837     virtual: false
3838 - deprecated: false
3839     description: year of birth of the student
3840     enum: null
3841     format: yyyy
3842     pattern: ([0-9]{4})?
3843     title: stud_birth_year
3844     type: integer
3845     x-aisb-dbms-attr:
3846         check: ''
3847         collate: ''
3848         default: ''
3849         fk: ''
3850         generatedValue: ''
3851         notNull: true
3852         pk: false
3853         size: null
3854         specialType: integer
3855         unique: false
3856     x-aisb-doc-attr:
3857         comments: ''
3858         constraints: ''
3859         entities: ''
3860         explanation: ''
3861         jointRespAggre:
3862             de: ''
3863             en: ''
3864         label: Year of birth
3865         tags: ''
3866         unique_id: ix0068
3867         version:
3868             created:
3869                 authors: JEF/BUW
3870                 date: '2022-10-31'
3871                 number: v2.0.RC1
3872             updated:
3873                 authors: RMS/BUW
3874                 date: '2024-06-06'
3875                 number: v3.5.0
3876         virtual: false
3877 - deprecated: false
3878     description: 'The nationality of a person grouped in the three categories Germany,
3879     EU and Other.
3880     If a person has two nationalities, than the priority of recording them is Germany,
3881     EU, Other. Possible values are listed in the enumeration table'
3882     enum:
3883     - description: Germany
3884       value: '1'
3885     - description: EU and the UK
3886       value: '2'
3887     - description: Other
3888       value: '3'
3889     format: ''
3890     pattern: d{0,1}
3891     title: stud_nationality_key
3892     type: integer
3893     x-aisb-dbms-attr:
3894         check: ''
3895         collate: ''
3896         default: ''
3897         fk: ''
3898         generatedValue: ''

```

```

3899     notNull: true
3900     pk: false
3901     size: null
3902     specialType: integer
3903     unique: false
3904     x-aisb-doc-attr:
3905         comments: A documentation of countries belonging to the EU is necessary. We
3906             did not discuss the treatment of a person with an UK nationality, but I (JEF/BUW)
3907             would count this as EU.
3908         constraints: ''
3909         entities: ''
3910         explanation: ''
3911         jointRespAggre:
3912             de: ''
3913             en: ''
3914         label: Grouped Nationality
3915         tags: ''
3916         unique_id: ix0069
3917         version:
3918             created:
3919                 authors: JEF/BUW
3920                 date: '2022-10-31'
3921                 number: v2.0.RC1
3922             updated:
3923                 authors: PP/BUW
3924                 date: '2024-10-16'
3925                 number: v3.5.1
3926         virtual: false
3927     - deprecated: false
3928     description: 'A numerical enumeration type that describes the type of higher education
3929         entrance qualification.
3930         The list of possible values is based on the educational qualifications in the
3931         German school system and are listed in the enumeration table'
3932     enum:
3933     - description: Beruflich Qualifizierte
3934       value: '1'
3935     - description: Berufsfachschule
3936       value: '2'
3937     - description: Berufsoberschule
3938       value: '3'
3939     - description: Deutsche Schule im Ausland
3940       value: '4'
3941     - description: Fachgymnasium
3942       value: '5'
3943     - description: Fachoberschule
3944       value: '6'
3945     - description: Gesamtschule
3946       value: '7'
3947     - description: Gymnasium
3948       value: '8'
3949     - description: Meister*innen und Gleichgestellte
3950       value: '9'
3951     - description: Schule im Ausland
3952       value: '10'
3953     - description: Schule im Ausland [allg. Hochschulreife]
3954       value: '11'
3955     - description: Schule im Ausland [fachgebundene Hochschulreife]
3956       value: '12'
3957     - description: Sonstige Studienberechtigung
3958       value: '13'
3959     - description: Studienkolleg [allg. Hochschulreife]
3960       value: '14'
3961     - description: Studienkolleg [fachgebundene Hochschulreife]

```

```

3962     value: '15'
3963 - description: Abendgymnasium
3964     value: '16'
3965     format: ''
3966     pattern: d*
3967     title: stud_ueq_form_key
3968     type: integer
3969 x-aisb-dbms-attr:
3970     check: ''
3971     collate: ''
3972     default: ''
3973     fk: ''
3974     generatedValue: ''
3975     notNull: true
3976     pk: false
3977     size: null
3978     specialType: integer
3979     unique: false
3980 x-aisb-doc-attr:
3981     comments: The list of possible values is described in the enumeration table
3982     constraints: ''
3983     entities: ''
3984     explanation: ''
3985     jointRespAggre:
3986         de: ''
3987         en: ''
3988     label: Type of university entrance qualification
3989     tags: ''
3990     unique_id: ix0007
3991     version:
3992         created:
3993             authors: JEF/BUW
3994             date: '2022-07-25'
3995             number: v1.0.0
3996         updated:
3997             authors: PP/BUW
3998             date: '2024-10-16'
3999             number: v3.5.1
4000     virtual: false
4001 - deprecated: false
4002     description: Grade of the higher education entrance qualification. The grade should
4003         be between 1.0 and 4.0 according to the German school system. Other grading
4004         systems must be converted to the German grading system.
4005     enum: null
4006     format: ''
4007     pattern: ([1-4](.[0-9])?)?
4008     title: stud_ueq_grade
4009     type: float
4010 x-aisb-dbms-attr:
4011     check: ''
4012     collate: ''
4013     default: ''
4014     fk: ''
4015     generatedValue: ''
4016     notNull: true
4017     pk: false
4018     size: null
4019     specialType: float
4020     unique: false
4021 x-aisb-doc-attr:
4022     comments: ''
4023     constraints: ''
4024     entities: ''

```

```

4025     explanation: ''
4026     jointRespAggre:
4027         de: ''
4028         en: ''
4029     label: Grade of university entrance qualification
4030     tags: ''
4031     unique_id: ix0010
4032     version:
4033         created:
4034             authors: JEF/BUW
4035             date: '2022-07-25'
4036             number: v1.0.0
4037         updated:
4038             authors: RMS/BUW
4039             date: '2024-06-06'
4040             number: v3.5.0
4041     virtual: false
4042 - deprecated: false
4043     description: The country in which the higher education entrance qualification
4044                 was obtained. The countries are grouped in the three categories Germany, EU
4045                 and Other. Possible values are listed in the enumeration table.
4046     enum:
4047         - description: Germany
4048           value: '1'
4049         - description: EU and the UK
4050           value: '2'
4051         - description: Other
4052           value: '3'
4053     format: ''
4054     pattern: d*
4055     title: stud_ueq_country_key
4056     type: integer
4057     x-aisb-dbms-attr:
4058         check: ''
4059         collate: ''
4060         default: ''
4061         fk: ''
4062         generatedValue: ''
4063         notNull: true
4064         pk: false
4065         size: null
4066         specialType: integer
4067         unique: false
4068     x-aisb-doc-attr:
4069         comments: See also nationality about discussion on the term 'EU'.
4070         constraints: ''
4071         entities: ''
4072         explanation: ''
4073         jointRespAggre:
4074             de: ''
4075             en: ''
4076         label: Grouped Country awarding the university entrance qualification
4077         tags: ''
4078         unique_id: ix0070
4079         version:
4080             created:
4081                 authors: JEF/BUW
4082                 date: '2022-07-25'
4083                 number: v1.0.0
4084             updated:
4085                 authors: PP/BUW
4086                 date: '2024-10-16'
4087                 number: v3.5.1

```

```

4088     virtual: false
4089 description: Dimension 'student' of the AIStudyBuddy data model
4090 title: student
4091 type: object
4092 x-aisb-doc-entity:
4093   comments: ''
4094   constraints: ''
4095   explanation: ''
4096   tags: ''
4097   version:
4098     date: '2024-06-06'
4099     number: v3.5.0
4100 - $id: v3.5.0-Draft
4101 $schema: schema.json
4102 abbrev: stad
4103 attributes:
4104 - deprecated: false
4105   description: ID that is used as an unique designation for a student_address at
4106     one location (university). The unique identifier must remain constant over time
4107   enum: null
4108   format: ''
4109   pattern: .*
4110   title: stad_id
4111   type: string
4112 x-aisb-dbms-attr:
4113   check: ''
4114   collate: ''
4115   default: ''
4116   fk: ''
4117   generatedValue: ''
4118   notNull: true
4119   pk: true
4120   size: null
4121   specialType: string
4122   unique: false
4123 x-aisb-doc-attr:
4124   comments: There are at least two ways of interpreting the student_address entity
4125     type. Either the type represents the current study address, or it represents
4126     the study addresses over time. Both interpretations have in common that address
4127     entities cannot exist separately from the student entities to which they are
4128     assigned. Therefore, the student address ID should correspond to the ID of
4129     the assigned student. If only one (current) address per student is possible,
4130     then the student ID is also sufficient to identify the study address. If additional
4131     aspects are to be included, e.g. the validity period over time, then the validity
4132     period should also be included in the address ID.
4133   constraints: ''
4134   entities: ''
4135   explanation: ''
4136   jointRespAggre:
4137     de: ''
4138     en: ''
4139   label: Student Address ID
4140   tags: ''
4141   unique_id: v0203n002
4142   version:
4143     created:
4144       authors: JEF/BUW
4145       date: '2023-02-22'
4146       number: v2.3.0
4147     updated:
4148       authors: RMS/BUW
4149       date: '2024-06-06'
4150       number: v3.5.0

```



```

4151     virtual: false
4152 - deprecated: false
4153 description: Reference to the student entity to whom the address belongs
4154 enum: null
4155 format: ''
4156 pattern: ''
4157 title: stad_stud_id
4158 type: ''
4159 x-aisb-dbms-attr:
4160   check: ''
4161   collate: ''
4162   default: ''
4163   fk: student.stud_id
4164   generatedValue: ''
4165   notNull: true
4166   pk: false
4167   size: null
4168   specialType: ''
4169   unique: false
4170 x-aisb-doc-attr:
4171   comments: ''
4172   constraints: ''
4173   entities: ''
4174   explanation: ''
4175   jointRespAggre:
4176     de: ''
4177     en: ''
4178   label: Student ID
4179   tags: ''
4180   unique_id: ix0003
4181   version:
4182     created:
4183       authors: JEF/BUW
4184       date: '2023-02-22'
4185       number: v2.3.0
4186     updated:
4187       authors: ''
4188       date: null
4189       number: ''
4190   virtual: false
4191 - deprecated: false
4192 description: Grouped address of the student's address where he or she is staying
4193 over the term.
4194 enum: null
4195 format: '[Country indicator]-[First three digits of postal code]'
4196 pattern: ([A-Z]{2}-[:alnum:]{3})?
4197 title: stad_address_term
4198 type: string
4199 x-aisb-dbms-attr:
4200   check: ''
4201   collate: ''
4202   default: ''
4203   fk: ''
4204   generatedValue: ''
4205   notNull: false
4206   pk: false
4207   size: null
4208   specialType: string
4209   unique: false
4210 x-aisb-doc-attr:
4211   comments: The grouping is based on the first three digits of the postcode of
4212     the semester address. There was a second proposal of grouping, namely by German
4213     districts. This would not work for students living abroad, but perhaps a mapping

```

```

4214         of German postal codes to districts should be supplied for a better grouping
4215         of German data.
4216     constraints: ''
4217     entities: ''
4218     explanation: ''
4219     jointRespAggre:
4220         de: ''
4221         en: ''
4222     label: Region of term address
4223     tags: ''
4224     unique_id: op0002
4225     version:
4226         created:
4227             authors: JEF/BUW
4228             date: '2022-10-31'
4229             number: v2.0RC1
4230         updated:
4231             authors: RMS/BUW
4232             date: '2024-06-06'
4233             number: v3.5.0
4234     virtual: false
4235 - deprecated: false
4236     description: Grouped address of the student's home address. See also the description
4237         at 'stad_address_term'.
4238     enum: null
4239     format: '[Country indicator]-[First three digits of postal code]'
4240     pattern: '([A-Z]{2}-[:alnum:]{3})?'
4241     title: stad_address_home
4242     type: string
4243     x-aisb-dbms-attr:
4244         check: ''
4245         collate: ''
4246         default: ''
4247         fk: ''
4248         generatedValue: ''
4249         notNull: false
4250         pk: false
4251         size: null
4252         specialType: string
4253         unique: false
4254     x-aisb-doc-attr:
4255         comments: The grouping is based on the first three digits of the postcode of
4256             the home address. There was a second proposal of grouping, namely by German
4257             districts. This would not work for students living abroad, but perhaps a mapping
4258             of German postal codes to districts should be supplied for a better grouping
4259             of German data.
4260     constraints: ''
4261     entities: ''
4262     explanation: ''
4263     jointRespAggre:
4264         de: ''
4265         en: ''
4266     label: Region of home address
4267     tags: ''
4268     unique_id: op0003
4269     version:
4270         created:
4271             authors: JEF/BUW
4272             date: '2022-10-31'
4273             number: v2.0RC1
4274         updated:
4275             authors: RMS/BUW
4276             date: '2024-06-06'

```

```

4277         number: v3.5.0
4278         virtual: false
4279     - deprecated: false
4280     description: New address is valid from this date on.
4281     enum: null
4282     format: yyyy-mm
4283     pattern: ([0-9]{4}-[0-9]{2})?
4284     title: stad_valid_from
4285     type: date
4286     x-aisb-dbms-attr:
4287         check: ''
4288         collate: ''
4289         default: ''
4290         fk: ''
4291         generatedValue: ''
4292         notNull: true
4293         pk: false
4294         size: null
4295         specialType: date
4296         unique: false
4297     x-aisb-doc-attr:
4298         comments: ''
4299         constraints: ''
4300         entities: ''
4301         explanation: ''
4302         jointRespAggre:
4303             de: ''
4304             en: ''
4305         label: Date from validity
4306         tags: ''
4307         unique_id: v0203n004
4308         version:
4309             created:
4310                 authors: JEF/BUW
4311                 date: '2023-02-07'
4312                 number: v2.3.0
4313             updated:
4314                 authors: RMS/BUW
4315                 date: '2024-06-06'
4316                 number: v3.5.0
4317         virtual: false
4318     - deprecated: false
4319     description: Old address is deprecated since this date.
4320     enum: null
4321     format: yyyy-mm
4322     pattern: ([0-9]{4}-[0-9]{2})?
4323     title: stad_valid_until
4324     type: date
4325     x-aisb-dbms-attr:
4326         check: ''
4327         collate: ''
4328         default: ''
4329         fk: ''
4330         generatedValue: ''
4331         notNull: true
4332         pk: false
4333         size: null
4334         specialType: date
4335         unique: false
4336     x-aisb-doc-attr:
4337         comments: ''
4338         constraints: ''
4339         entities: ''

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4340     explanation: ''
4341     jointRespAggre:
4342         de: ''
4343         en: ''
4344     label: Date since invalidity
4345     tags: ''
4346     unique_id: v0203n005
4347     version:
4348         created:
4349             authors: JEF/BUW
4350             date: '2023-02-07'
4351             number: v2.3.0
4352         updated:
4353             authors: RMS/BUW
4354             date: '2024-06-06'
4355             number: v3.5.0
4356     virtual: false
4357     description: Dimension 'student_address' of the AIStudyBuddy data model.
4358     title: student_address
4359     type: object
4360     x-aisb-doc-entity:
4361         comments: ''
4362         constraints: ''
4363         explanation: ''
4364         tags: ''
4365         version:
4366             date: '2024-06-06'
4367             number: v3.5.0
4368 - $id: v3.5.0-Draft
4369 $schema: schema.json
4370 abbrev: stpr
4371 attributes:
4372 - deprecated: false
4373     description: ID that is used as an unique designation for a study program at one
4374         location (university)
4375     enum: null
4376     format: ''
4377     pattern: .*
4378     title: stpr_id
4379     type: string
4380     x-aisb-dbms-attr:
4381         check: ''
4382         collate: ''
4383         default: ''
4384         fk: ''
4385         generatedValue: ''
4386         notNull: true
4387         pk: true
4388         size: null
4389         specialType: string
4390         unique: false
4391     x-aisb-doc-attr:
4392         comments: The unique designation used does not change over time.
4393         constraints: ''
4394         entities: ''
4395         explanation: ''
4396         jointRespAggre:
4397             de: ''
4398             en: ''
4399         label: Study Program ID
4400         tags: ''
4401         unique_id: ''
4402         version:

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4403         created:
4404             authors: RMS/BUW
4405             date: '2024-07-23'
4406             number: v3.5.0
4407         updated:
4408             authors: PP/BUW
4409             date: '2024-10-29'
4410             number: v.3.5.2
4411         virtual: false
4412     - deprecated: false
4413     description: Reference to the university offering the study program
4414     enum: null
4415     format: ''
4416     pattern: ''
4417     title: stpr_univ_id
4418     type: ''
4419     x-aisb-dbms-attr:
4420         check: ''
4421         collate: ''
4422         default: ''
4423         fk: university.univ_id
4424         generatedValue: ''
4425         notNull: true
4426         pk: false
4427         size: null
4428         specialType: ''
4429         unique: false
4430     x-aisb-doc-attr:
4431         comments: Reference to an university entity
4432         constraints: ''
4433         entities: ''
4434         explanation: ''
4435         jointRespAggre:
4436             de: ''
4437             en: ''
4438         label: University ID
4439         tags: ''
4440         unique_id: v0203n007
4441         version:
4442             created:
4443                 authors: RMS/BUW
4444                 date: '2024-07-23'
4445                 number: v3.5.0
4446             updated:
4447                 authors: PP/BUW
4448                 date: '2024-10-29'
4449                 number: v.3.5.2
4450             virtual: false
4451     - deprecated: false
4452     description: Names introduced for the study program. Up to three names (short,
4453         medium, long) can be used in different languages.
4454     enum: null
4455     format: ''
4456     pattern: ''
4457     title: stpr_name
4458     type: '#LocalizedName'
4459     x-aisb-dbms-attr:
4460         check: ''
4461         collate: ''
4462         default: ''
4463         fk: ''
4464         generatedValue: ''
4465         notNull: true

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4466     pk: false
4467     size: null
4468     specialType: '#LocalizedName'
4469     unique: false
4470   x-aisb-doc-attr:
4471     comments: ''
4472     constraints: ''
4473     entities: ''
4474     explanation: ''
4475     jointRespAggre:
4476       de: ''
4477       en: ''
4478     label: Name of the Study Program
4479     tags: ''
4480     unique_id: ''
4481     version:
4482       created:
4483         authors: RMS/BUW
4484         date: '2024-07-23'
4485         number: v3.5.0
4486       updated:
4487         authors: PP/BUW
4488         date: '2024-10-29'
4489         number: v.3.5.2
4490     virtual: false
4491   - deprecated: false
4492     description: Identifies the study program as a partial study program that only
4493       forms a fully-fledged study program together with other partial study programs
4494     enum: null
4495     format: ''
4496     pattern: ([01])?
4497     title: str_is_partial
4498     type: boolean
4499   x-aisb-dbms-attr:
4500     check: ''
4501     collate: ''
4502     default: ''
4503     fk: ''
4504     generatedValue: ''
4505     notNull: true
4506     pk: false
4507     size: null
4508     specialType: boolean
4509     unique: false
4510   x-aisb-doc-attr:
4511     comments: ''
4512     constraints: ''
4513     entities: ''
4514     explanation: ''
4515     jointRespAggre:
4516       de: ''
4517       en: ''
4518     label: Flag of partial
4519     tags: ''
4520     unique_id: ''
4521     version:
4522       created:
4523         authors: RMS/BUW
4524         date: '2024-07-23'
4525         number: v3.5.0
4526       updated:
4527         authors: PP/BUW
4528         date: '2024-10-29'

```

```

4529         number: v.3.5.2
4530     virtual: false
4531 - deprecated: false
4532     description: "Some study programs have an addendum like 'Master of Education --\
4533     \ Lehramt f\xFCr Gymnasium/Gesamtschule'. This addendum can be stored here."
4534     enum: null
4535     format: ''
4536     pattern: .*
4537     title: stpr_addendum
4538     type: string
4539     x-aisb-dbms-attr:
4540         check: ''
4541         collate: ''
4542         default: ''
4543         fk: ''
4544         generatedValue: ''
4545         notNull: false
4546         pk: false
4547         size: null
4548         specialType: string
4549         unique: false
4550     x-aisb-doc-attr:
4551         comments: ''
4552         constraints: ''
4553         entities: ''
4554         explanation: ''
4555         jointRespAggre:
4556             de: ''
4557             en: ''
4558         label: Addendum to the degree of the study program
4559         tags: ''
4560         unique_id: ''
4561         version:
4562             created:
4563                 authors: RMS/BUW
4564                 date: '2024-07-23'
4565                 number: v3.5.0
4566             updated:
4567                 authors: PP/BUW
4568                 date: '2024-10-29'
4569                 number: v.3.5.2
4570     virtual: false
4571 - deprecated: false
4572     description: This is the (academic) degree awarded to the graduate upon successful
4573     completion of the study program. Possible values are listed in the enumeration
4574     table.
4575     enum:
4576     - description: Bachelor of Arts (B.A.)
4577       value: B.A.
4578     - description: Bachelor of Business Administration (BBA)
4579       value: BBA
4580     - description: Bachelor of Education (B.Ed.)
4581       value: B.Ed.
4582     - description: Bachelor of Engineering (B.Eng.)
4583       value: B.Eng.
4584     - description: Bachelor of Fine Arts (B.F.A.)
4585       value: B.F.A.
4586     - description: Bachelor of Musical Arts (B.M.A.)
4587       value: B.M.A.
4588     - description: Bachelor of Music (B.Mus.)
4589       value: B.Mus.
4590     - description: Bachelor of Science (B.Sc.)
4591       value: B.Sc.

```

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4592 - description: Bachelor of Laws (LL.B.)
4593   value: LL.B.
4594 - description: Master of Laws (LL.M.)
4595   value: LL.M.
4596 - description: Master of Arts (M.A.)
4597   value: M.A.
4598 - description: Master of Business Administration (MBA)
4599   value: MBA
4600 - description: Master of Education (M.Ed.)
4601   value: M.Ed.
4602 - description: Master of Engineering (M.Eng.)
4603   value: M.Eng.
4604 - description: Master of Fine Arts (M.F.A.)
4605   value: M.F.A.
4606 - description: Master of Musical Arts (M.M.A.)
4607   value: M.M.A.
4608 - description: Master of Music (M.Mus.)
4609   value: M.Mus.
4610 - description: Master of Science (M.Sc.)
4611   value: M.Sc.
4612 format: ''
4613 pattern: .*
4614 title: stpr_degree
4615 type: string
4616 x-aisb-dbms-attr:
4617   check: ''
4618   collate: ''
4619   default: ''
4620   fk: ''
4621   generatedValue: ''
4622   notNull: true
4623   pk: false
4624   size: null
4625   specialType: string
4626   unique: false
4627 x-aisb-doc-attr:
4628   comments: "At this point, we reduce the possible values to those academic titles\
4629     \ that are awarded in Germany by state or state-recognized institutions. Possible\
4630     \ deviations from the official titles can be indicated in the name of the\
4631     \ study program. \nOne example of this reduction is the combinatorial Bachelor\
4632     \ of Arts in Wuppertal. Here, the internally known title \"(Kombi) B.A.\" \
4633     \ is not used, but the official \"Bachelor of Arts (B.A.).\" In the stpr_name\
4634     \ attribute, the study program can then be described in more detail, e.g.\
4635     \ as \"Combinatorial study program with Bachelor of Arts degree\"."
4636   constraints: ''
4637   entities: ''
4638   explanation: ''
4639   jointRespAggre:
4640     de: ''
4641     en: ''
4642   label: Degree of the study program
4643   tags: ''
4644   unique_id: ''
4645   version:
4646     created:
4647       authors: RMS/BUW
4648       date: '2024-07-23'
4649       number: v3.5.0
4650     updated:
4651       authors: PP/BUW
4652       date: '2024-10-29'
4653       number: v.3.5.2
4654   virtual: false

```



```

4655 - deprecated: false
4656 description: To compare study programs between universities, the keys of IT.NRW
4657 are used. They are more detailed, than the set of keys provided by the Federal
4658 Statistical Office. Possible values are listed in the enumeration table.
4659 enum:
4660 - description: "\xC4gyptologie"
4661   value: '001'
4662 - description: Prozess-, Energie- und Umwelttechnik
4663   value: A01
4664 - description: Mergers & Acquisitions extern
4665   value: B01
4666 - description: Medizinische Biologie
4667   value: C01
4668 - description: Gesundheitswirtschaft
4669   value: D01
4670 - description: NanoEngineering
4671   value: E01
4672 - description: Anleitung und Mentoring in den Gesundheitsberufen
4673   value: F01
4674 - description: International Industry and Trade Management (berufsbegleitend)
4675   value: G01
4676 - description: Business Analytics
4677   value: H01
4678 - description: Sportmedizin
4679   value: I01
4680 - description: Feinwerktechnik
4681   value: J01
4682 - description: Afrikanistik
4683   value: '002'
4684 - description: Simulation und Experimentaltechnik
4685   value: A02
4686 - description: Datenanalyse und Datenmanagement
4687   value: B02
4688 - description: 'Literaturwissenschaft: Literatur, Kultur und Medien'
4689   value: C02
4690 - description: Gesundheitswirtschaft (berufsbegl.)
4691   value: D02
4692 - description: "Politikmanagement, Public Policy und \xF6ffentliche Verwaltung"
4693   value: E02
4694 - description: "Berufsp\xE4dagogik Pflege und Gesundheit"
4695   value: F02
4696 - description: Logistic and Supply Chain Management (berufsbegleitend)
4697   value: G02
4698 - description: "Bio\xF6konomie"
4699   value: H02
4700 - description: Produktionsmanagement International
4701   value: I02
4702 - description: Glastechnik/Keramik
4703   value: J02
4704 - description: Agrarwissenschaft
4705   value: '003'
4706 - description: Kommunikations- und Informationstechnik
4707   value: A03
4708 - description: Automation and Robotics
4709   value: B03
4710 - description: 'Sprachwissenschaft: Deutsch, Englisch und Romanische Sprachen'
4711   value: C03
4712 - description: Handwerksmanagement
4713   value: D03
4714 - description: Spanische Sprache und Kultur
4715   value: E03
4716 - description: "P\xE4dagogik der Kindheit"
4717   value: F03

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4718 - description: Sporttechnologie
4719   value: G03
4720 - description: Wissenschafts-/Technikgeschichte
4721   value: H03
4722 - description: Diakoniewissenschaft
4723   value: I03
4724 - description: Milch- und Molkereiwirtschaft
4725   value: J03
4726 - description: Altkatholische Theologie
4727   value: '004'
4728 - description: Autonomous Systems
4729   value: A04
4730 - description: Bergbau (Praxissemester)
4731   value: B04
4732 - description: Foreign Languages in Adult Education
4733   value: C04
4734 - description: Informatikmanagement
4735   value: D04
4736 - description: Rechtswissenschaft (Englisch - Deutsch)
4737   value: E04
4738 - description: Regenerative Energien
4739   value: F04
4740 - description: Rehabilitation und Gesundheitsmanagement
4741   value: G04
4742 - description: Sportmanagement (Schwerpunkt Sportwissenschaft)
4743   value: I04
4744 - description: Nautik/Seefahrt
4745   value: J04
4746 - description: Klassische Philologie / Altphilologie
4747   value: '005'
4748 - description: Biomedical Engineering
4749   value: A05
4750 - description: Biotechnologie / Molekulare Biotechnologie
4751   value: B05
4752 - description: Differenzierte Musikerausbildung Instrumental
4753   value: C05
4754 - description: Medienkommunikation und Journalismus
4755   value: D05
4756 - description: Business Journalism
4757   value: E05
4758 - description: Betriebswirtschaft PLuS
4759   value: F05
4760 - description: Exercise Science and Coaching
4761   value: G05
4762 - description: Wirtschaftsingenieurwesen / Automotive
4763   value: H05
4764 - description: "Pal\xE4ontologie"
4765   value: I05
4766 - description: Weinbau und Kellerwirtschaft
4767   value: J05
4768 - description: Altamerikanistik
4769   value: '006'
4770 - description: Wirtschaftsinformatik extern
4771   value: A06
4772 - description: Computational Engineering Science
4773   value: B06
4774 - description: Automotive
4775   value: C06
4776 - description: Medienkommunikation und Journalismus (berufsbegl.)
4777   value: D06
4778 - description: Katastrophenvorsorge und Katastrophenmanagement
4779   value: E06
4780 - description: International Business Management

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4781     value: F06
4782     - description: Recht und Management
4783     value: G06
4784     - description: Wirtschaftsingenieurwesen / Energiemanagement
4785     value: H06
4786     - description: Geochemie/Petrologie
4787     value: I06
4788     - description: Sachunterricht (einschl. Schulgarten)
4789     value: J06
4790     - description: Graduate School of Chemistry
4791     value: A07
4792     - description: Biomedical Engineering
4793     value: B07
4794     - description: Computersimulation in den Naturwissenschaften
4795     value: C07
4796     - description: Produktentwicklung / Konstruktion
4797     value: D07
4798     - description: Redevelopment (Low-Profit-Immobilien) extern
4799     value: E07
4800     - description: Altamerikanistik und Ethnologie
4801     value: F07
4802     - description: Orthodoxe Theologie, - Religionslehre
4803     value: G07
4804     - description: Wirtschaftsingenieurwesen / Informationstechnik
4805     value: H07
4806     - description: Medizin (allgemein) (Bonn-Siegen)
4807     value: I07
4808     - description: Archivwesen
4809     value: J07
4810     - description: Anglistik
4811     value: 008
4812     - description: Leitung und Management in multiprofessionalen Gesundheits- und
4813       Sozialdiensten (WBSTG)
4814     value: A08
4815     - description: Media Informatics
4816     value: B08
4817     - description: Textil- und Bekleidungstechnik (kooperativ)
4818     value: C08
4819     - description: "Unternehmensf\xFChrung in der mittelst\xE4ndischen Wirtschaft"
4820     value: D08
4821     - description: Redevelopment (Umgestaltung industrieller FolgeLandschaften) extern
4822     value: E08
4823     - description: "Ern\xE4hrungs- und Lebensmittelwissenschaften"
4824     value: F08
4825     - description: Industrielles Servicemanagement (b.i.)
4826     value: G08
4827     - description: Unternehmensmanagement
4828     value: H08
4829     - description: Elektrotechnik/Elektronik (Orientierungssemester)
4830     value: I08
4831     - description: Arbeits- und Berufsberatung
4832     value: J08
4833     - description: Maschinenbauinformatik
4834     value: 009
4835     - description: Graduate School of Production Engineering and Logistics
4836     value: A09
4837     - description: Werkstoffinformatik (Praxissemester)
4838     value: B09
4839     - description: Technologie der Kosmetika und Waschmittel
4840     value: C09
4841     - description: Management und Controlling in der Gesundheitswirtschaft
4842     value: D09
4843     - description: Strategic Marketing Management

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4844     value: E09
4845     - description: Osteuropastudien
4846     value: F09
4847     - description: Industrielles Servicemanagement (a.i.)
4848     value: G09
4849     - description: Prozessmanagement
4850     value: H09
4851     - description: Kunstgeschichte
4852     value: I09
4853     - description: Arbeitsverwaltung
4854     value: J09
4855     - description: Chemieingenieurwesen (Praxissemester) (kooperativ)
4856     value: A10
4857     - description: Bio- und Nanotechnologien
4858     value: B10
4859     - description: Media Production
4860     value: C10
4861     - description: Fahrzeugbau/Automotive Engineering
4862     value: D10
4863     - description: Internationales Kunstmanagement
4864     value: E10
4865     - description: Sound Studies
4866     value: F10
4867     - description: Bionik
4868     value: G10
4869     - description: Arzneimittelforschung
4870     value: H10
4871     - description: Kunstwissenschaft
4872     value: I10
4873     - description: Bundeswehrverwaltung
4874     value: J10
4875     - description: "Ern\xE4hrungs- und Hauswirtschaftswissenschaft"
4876     value: A11
4877     - description: Mechatronik (VBSTG)
4878     value: B11
4879     - description: Pharmatechnik
4880     value: C11
4881     - description: Computer Aided Conception and Production in Mechanical Engineering
4882     extern
4883     value: D11
4884     - description: Interamerikanische Studien
4885     value: E11
4886     - description: Therapie- und Gesundheitsmanagement
4887     value: F11
4888     - description: Bionik kooperativ
4889     value: G11
4890     - description: Versicherungsrecht
4891     value: H11
4892     - description: Verwaltungsbetriebswirtschaftslehre
4893     value: I11
4894     - description: Innere Verwaltung
4895     value: J11
4896     - description: "Arch\xE4ologie"
4897     value: '012'
4898     - description: Elektrotechnik (VBSTG)
4899     value: B12
4900     - description: Combustion Engines
4901     value: D12
4902     - description: Kultur, Individuum und Gesellschaft
4903     value: E12
4904     - description: Production and Management
4905     value: F12
4906     - description: Sprachtherapie

```

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4907     value: G12
4908     - description: Digital Narratives extern
4909     value: H12
4910     - description: Fotografie-Wissenschaft
4911     value: I12
4912     - description: Bankwesen
4913     value: J12
4914     - description: Architektur
4915     value: '013'
4916     - description: Anlagen- und Verfahrenstechnik
4917     value: A13
4918     - description: Systems Engineering and Engineering Management
4919     value: B13
4920     - description: "Virtuelle Realit\xE4t"
4921     value: C13
4922     - description: Production Systems Engineering extern
4923     value: D13
4924     - description: Geophysik und Meteorologie
4925     value: E13
4926     - description: Lebenswissenschaften
4927     value: F13
4928     - description: Internet-Sicherheit
4929     value: G13
4930     - description: Journalismus / Public Relations extern
4931     value: H13
4932     - description: "Quart\xE4rforschung und Geoarch\xE4ologie"
4933     value: I13
4934     - description: Finanzverwaltung
4935     value: J13
4936     - description: Astronomie
4937     value: '014'
4938     - description: Lizentiat in Diakonik (ABSTG)
4939     value: A14
4940     - description: Molekulare Biologie
4941     value: B14
4942     - description: Medien und angewandte Informationstechnologie
4943     value: C14
4944     - description: Umweltingenieurwissenschaften
4945     value: D14
4946     - description: Health Administration
4947     value: E14
4948     - description: Ecumenical Studies
4949     value: F14
4950     - description: "Gesundheits\xF6konomie / Gesundheitsmanagement"
4951     value: G14
4952     - description: Elektrische Energietechnik extern
4953     value: H14
4954     - description: Popularmusik
4955     value: I14
4956     - description: Verkehrswesen
4957     value: J14
4958     - description: Zivilrecht
4959     value: A15
4960     - description: Online-Redakteur
4961     value: B15
4962     - description: "Interdisziplin\xE4re Medienwissenschaft"
4963     value: C15
4964     - description: "Psychologie der Ver\xE4nderung"
4965     value: D15
4966     - description: Rechtswissenschaft (2 semestriger WBSTG)
4967     value: E15
4968     - description: Evangelische Theologie und Hermeneutik
4969     value: F15

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4970 - description: Zahnmedizin (WBSTG, 4 semestrig)
4971   value: G15
4972 - description: Immunbiologie
4973   value: H15
4974 - description: Management und Digitalisierung
4975   value: I15
4976 - description: Wissenschaftsgeschichte/Technikgeschichte
4977   value: J15
4978 - description: Baltische Philologie
4979   value: '016'
4980 - description: "\xD6ffentliches Recht"
4981   value: A16
4982 - description: Sprachen und Wirtschaft
4983   value: B16
4984 - description: Architektur und Innenarchitektur
4985   value: C16
4986 - description: Media and Imaging Technology
4987   value: D16
4988 - description: Workplace Health Management
4989   value: E16
4990 - description: Lateinamerika- und Altamerikastudien
4991   value: F16
4992 - description: Musikjournalismus
4993   value: G16
4994 - description: Politisch-Historische Studien
4995   value: H16
4996 - description: Internationales Eventmanagement
4997   value: I16
4998 - description: Kartographie
4999   value: J16
5000 - description: Bauingenieurwesen/Ingenieurbau
5001   value: '017'
5002 - description: Communications Engineering
5003   value: A17
5004 - description: Internationales Management und interkulturelle Kommunikation
5005   value: B17
5006 - description: Kognitive Informatik
5007   value: C17
5008 - description: "Sprachen und Kulturen \xC4gyptens und Altvorderasiens"
5009   value: D17
5010 - description: "St\xE4dtebau"
5011   value: E17
5012 - description: Soziale Arbeit (Teilzeit)
5013   value: F17
5014 - description: Film und Audiovisuelle Medien
5015   value: G17
5016 - description: Wasserwissenschaften
5017   value: H17
5018 - description: Projektmanagement
5019   value: I17
5020 - description: "Geo\xF6kologie"
5021   value: J17
5022 - description: Baukunst
5023   value: 018
5024 - description: Pflegewissenschaft
5025   value: A18
5026 - description: International Business Studies (IBS)
5027   value: B18
5028 - description: Medieninformatik und Gestaltung
5029   value: C18
5030 - description: "Arch\xE4ologie, Geschichte, Landschaft"
5031   value: D18
5032 - description: Vermessung

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5033     value: E18
5034     - description: Textile Produkte
5035     value: F18
5036     - description: Gesundheitstechnik (Praxissemester)
5037     value: G18
5038     - description: Visuelle Anthropologie extern
5039     value: H18
5040     - description: Controlling
5041     value: I18
5042     - description: Allgemeiner Verwaltungsdienst extern
5043     value: J18
5044     - description: Mediengestaltung
5045     value: O19
5046     - description: European Studies in Design
5047     value: A19
5048     - description: Medienwissenschaft (Pbz)
5049     value: B19
5050     - description: Islamunterricht
5051     value: C19
5052     - description: "Klassische und Christliche Arch\xE4ologie"
5053     value: D19
5054     - description: Applied IT-Security
5055     value: E19
5056     - description: International Business and Management
5057     value: F19
5058     - description: Produktentwicklung (Praxissemester)
5059     value: G19
5060     - description: Experimentelle Medizin
5061     value: H19
5062     - description: "Computergest\xFCtzte Sozialwissenschaft"
5063     value: I19
5064     - description: Nachhaltigkeitsmanagement
5065     value: J19
5066     - description: Bergbau
5067     value: 'O20'
5068     - description: Versicherungswirtschaft
5069     value: A20
5070     - description: "Europ\xE4ische Studien / \xC9tudes Europa\xE9ennes"
5071     value: C20
5072     - description: Kultur- und Sozialanthropologie
5073     value: D20
5074     - description: Russische Kultur
5075     value: E20
5076     - description: Elemente der Mathematik
5077     value: F20
5078     - description: Wirtschaftspolitischer Journalismus
5079     value: G20
5080     - description: Public History
5081     value: H20
5082     - description: Mathematische Statistik/Wahrscheinlichkeitsrechnung extern
5083     value: I20
5084     - description: Wissenschaftssoziologie
5085     value: J20
5086     - description: Betriebswirtschaft / -lehre
5087     value: 'O21'
5088     - description: Maschinen- und Anlagenbau
5089     value: A21
5090     - description: Kunst - Musik
5091     value: B21
5092     - description: Musik im Kontext
5093     value: C21
5094     - description: Regionalstudien Ostmitteleuropa
5095     value: D21

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5096 - description: Verteilte Systeme
5097   value: E21
5098 - description: Grundlagen der Naturwissenschaft und Technik
5099   value: F21
5100 - description: Economics und Journalismus
5101   value: G21
5102 - description: Kunstvermittlung und Kulturmanagement
5103   value: H21
5104 - description: Wirtschaftsingenieurwesen - Anlagenbau extern
5105   value: I21
5106 - description: Digitale Verwaltung und Informationstechnik
5107   value: J21
5108 - description: Bibliothekswissenschaft
5109   value: '022'
5110 - description: "Interdisziplin\xE4re Studien (Schwerpunkt Ingenieurwissenschaften)"
5111   value: A22
5112 - description: Medien- und Kulturwissenschaft
5113   value: B22
5114 - description: "Musik und Kreativit\xE4t"
5115   value: C22
5116 - description: Antike Kulturen
5117   value: D22
5118 - description: Verfahrenstechnik und Versorgungstechnik
5119   value: E22
5120 - description: Applied Chemistry
5121   value: F22
5122 - description: Wirtschaftsingenieurwesen / Handwerk
5123   value: G22
5124 - description: Technomathematik extern
5125   value: H22
5126 - description: Wirtschaftsingenieurwesen - Bauingenieurwesen extern
5127   value: I22
5128 - description: Nachhaltiges Design extern
5129   value: J22
5130 - description: Bildende Kunst
5131   value: '023'
5132 - description: Information Engineering
5133   value: A23
5134 - description: Kulturwirt
5135   value: B23
5136 - description: Musik und Vermittlung
5137   value: C23
5138 - description: Health Care Management
5139   value: D23
5140 - description: "Kultur, \xC4sthetik, Medien"
5141   value: E23
5142 - description: Prozesstechnik (berufsbegleitend)
5143   value: F23
5144 - description: Angewandte Therapiewissenschaften
5145   value: G23
5146 - description: Internationales Management extern
5147   value: H23
5148 - description: "Europ\xE4ische Wirtschaft extern"
5149   value: I23
5150 - description: "Medienp\xE4dagogik"
5151   value: J23
5152 - description: Soziale Gerontologie (WBSTG)
5153   value: '024'
5154 - description: "Energie-, Geb\xE4ude- und Umwelttechnik"
5155   value: A24
5156 - description: Wirtschaftsingenieurwesen - Wiwi
5157   value: B24
5158 - description: International Business

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5159     value: C24
5160     - description: Health Care Management (Teilzeit)
5161     value: D24
5162     - description: "Sozialarbeit / Sozialp\xE4dagogik in globalisierten Gesellschaften"
5163     value: E24
5164     - description: Elektrotechnik, Informationstechnik und Technische Informatik
5165     value: F24
5166     - description: Redevelopment - Real Estate and Urban Management extern
5167     value: G24
5168     - description: Medienmanagement extern
5169     value: H24
5170     - description: Management und Informationssysteme (VBSTG)
5171     value: I24
5172     - description: Wirtschaft und Schauspiel
5173     value: J24
5174     - description: Biochemie
5175     value: '025'
5176     - description: "Technisches Management in der Energie-, Geb\xE4ude- und Umwelttechnik"
5177     value: A25
5178     - description: Technische Logistik
5179     value: B25
5180     - description: Konferenzdolmetschen
5181     value: C25
5182     - description: Produktentwicklung im Maschinenbau
5183     value: D25
5184     - description: Informatik (kooperativ)
5185     value: E25
5186     - description: International Business (IST)
5187     value: F25
5188     - description: Technologie der Kosmetika und Waschmittel (Praxissemester)
5189     value: G25
5190     - description: Steuerrecht extern
5191     value: H25
5192     - description: Industrieservice-Management (VBSTG)
5193     value: I25
5194     - description: "Sport und Ern\xE4hrung"
5195     value: J25
5196     - description: Biologie
5197     value: '026'
5198     - description: Process Engineering
5199     value: A26
5200     - description: Wirtschaftsingenieurwesen - BuH (Praxissemester)
5201     value: B26
5202     - description: Korrosionsschutztechnik
5203     value: C26
5204     - description: Business Management
5205     value: D26
5206     - description: Medizinische Physik
5207     value: E26
5208     - description: Rehabilitationswissenschaften
5209     value: F26
5210     - description: Pharmatechnik (Praxissemester)
5211     value: G26
5212     - description: Public Policy
5213     value: H26
5214     - description: "Energie- und Wasser\xF6konomik (VBSTG)"
5215     value: I26
5216     - description: Philosophie, Literatur- und Sprachwissenschaft
5217     value: J26
5218     - description: "Blindenp\xE4dagogik"
5219     value: '027'
5220     - description: Process Engineering (kooperativ)
5221     value: A27

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5222 - description: Computer Engineering
5223   value: B27
5224 - description: Molekulare Biomedizin
5225   value: C27
5226 - description: Information Systems
5227   value: D27
5228 - description: Betriebswirtschaft / Business Studies
5229   value: E27
5230 - description: Architektur und Stadtraum
5231   value: F27
5232 - description: Lebensmitteltechnologie (Praxissemester)
5233   value: G27
5234 - description: "Klang und Realit\xE4t"
5235   value: H27
5236 - description: Internationale Betriebswirtschaft/Management (VBSTG)
5237   value: I27
5238 - description: Teilchenphysik
5239   value: J27
5240 - description: Mechanical Engineering (kooperativ)
5241   value: A28
5242 - description: Computer Science and Communications Engineering
5243   value: B28
5244 - description: Eventmanagement
5245   value: C28
5246 - description: "Steuern und Wirtschaftspr\xFCfung"
5247   value: D28
5248 - description: Aerospace Engineering
5249   value: E28
5250 - description: Eurythmie (berufsbegleitend)
5251   value: F28
5252 - description: Urbane Kultur, Gesellschaft und Raum
5253   value: G28
5254 - description: Nachhaltigkeitswissenschaft
5255   value: H28
5256 - description: Gesundheitsdatenmanagement
5257   value: I28
5258 - description: Arbeitssoziologie
5259   value: J28
5260 - description: Berufsbildungsingenieur Maschinenbau
5261   value: O29
5262 - description: Medienmanagement
5263   value: A29
5264 - description: Automation and Control Engineering
5265   value: B29
5266 - description: Internationales Hotel- & Tourismusmanagement
5267   value: C29
5268 - description: Business Administration and Management
5269   value: D29
5270 - description: Rechtsanwalt
5271   value: E29
5272 - description: Kunsttherapie
5273   value: F29
5274 - description: "Energie-, Geb\xE4ude- und Umwelttechnik (Praxissemester)"
5275   value: G29
5276 - description: "Kindheitssp\xE4dagogik und Management"
5277   value: H29
5278 - description: Elektronischer Handel
5279   value: I29
5280 - description: Soziologie und Philosophie
5281   value: J29
5282 - description: Medienwissenschaft
5283   value: 'O30'
5284 - description: Caritaswissenschaft (ABSTG)

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5285     value: A30
5286     - description: Electrical and Electronic Engineering
5287     value: B30
5288     - description: Informationswissenschaft und Sprachtechnologie
5289     value: C30
5290     - description: IT-Management and Information Systems
5291     value: D30
5292     - description: Bewegung und Sport im Alter
5293     value: E30
5294     - description: "Gemeindep\xE4dagogik und Diakonie (Teilzeit)"
5295     value: F30
5296     - description: "Wirtschaftsingenieurwesen / Energie-, Geb\xE4ude- und Umwelttechnik\
5297       \ (Praxissemester)"
5298     value: G30
5299     - description: Nachhaltige Ingenieurwissenschaft
5300     value: H30
5301     - description: Physikalische Technik und Lasertechnik
5302     value: I30
5303     - description: "Digitale Arch\xE4ologie"
5304     value: J30
5305     - description: Byzantinistik und Neugriechische Philologie
5306     value: '031'
5307     - description: Medienwirtschaft (Teilzeit)
5308     value: A31
5309     - description: Medizin-Management
5310     value: B31
5311     - description: Politik und Wirtschaft
5312     value: C31
5313     - description: Gesundheitswissenschaft / Pflege
5314     value: D31
5315     - description: "Sport, Gesundheit und Pr\xE4vention"
5316     value: E31
5317     - description: "Heilp\xE4dagogik (Teilzeit)"
5318     value: F31
5319     - description: Elektrotechnik (VBSTG) (Praxissemester)
5320     value: G31
5321     - description: Medizintechnik
5322     value: H31
5323     - description: Menschenrechte
5324     value: I31
5325     - description: Pflege und Digitalisierung
5326     value: J31
5327     - description: Chemie
5328     value: '032'
5329     - description: Medienmanagement (WBSTG)
5330     value: A32
5331     - description: Philosophie und Kulturreflexion
5332     value: B32
5333     - description: Business Communication
5334     value: C32
5335     - description: 'Jugendhilfe: Konzeptionsentwicklung und Organisationsgestaltung'
5336     value: D32
5337     - description: Sport, Erlebnis und Bewegung
5338     value: E32
5339     - description: Pflege (Teilzeit)
5340     value: F32
5341     - description: Technische Chemie (Praxissemester)
5342     value: G32
5343     - description: Theologie und globale Entwicklung
5344     value: H32
5345     - description: Musikalische Akustik
5346     value: I32
5347     - description: Marketing und Kommunikation

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5348     value: J32
5349     - description: Chemietechnik
5350     value: '033'
5351     - description: Mechatronics
5352     value: A33
5353     - description: "Technische Orthop\xe4die"
5354     value: B33
5355     - description: Beratung und Vertretung im sozialen Recht
5356     value: C33
5357     - description: Photonik
5358     value: D33
5359     - description: Sporttourismus und Erholungsmanagement
5360     value: E33
5361     - description: "Wirtschaftsingenieurwesen / Energie-, Geb\xe4ude- und Umwelttechnik"
5362     value: F33
5363     - description: Pharmazeutische Chemie (Praxissemester)
5364     value: G33
5365     - description: "Gesundheits\xf6konomie extern"
5366     value: H33
5367     - description: Chemie und Biochemie
5368     value: I33
5369     - description: Marken- und Modemanagement
5370     value: J33
5371     - description: "Lehrer f\xfcr Gesundheitsberufe (Praxissemester)"
5372     value: '034'
5373     - description: Mathematik - Methoden und Modelle
5374     value: A34
5375     - description: Entsorgungsingenieurwesen
5376     value: B34
5377     - description: Asienwissenschaften
5378     value: C34
5379     - description: Bildinformatik
5380     value: D34
5381     - description: Geospatial Technologies
5382     value: E34
5383     - description: Medizinrecht
5384     value: F34
5385     - description: Banking and Finance (Praxissemester)
5386     value: G34
5387     - description: Sicherheitstechnik extern
5388     value: H34
5389     - description: Digitale Psychologie
5390     value: I34
5391     - description: Wirtschafts- und Arbeitsrecht extern
5392     value: J34
5393     - description: Darstellende Kunst
5394     value: '035'
5395     - description: Mathematik - Methoden und Modelle (TZ)
5396     value: A35
5397     - description: Siedlungswasserwirtschaft
5398     value: B35
5399     - description: "Deutsch-Franz\xf6sische Studien"
5400     value: C35
5401     - description: Bildung und Soziale Arbeit
5402     value: D35
5403     - description: Sport und Leistung
5404     value: E35
5405     - description: Wirtschaftsingenieurwesen / Bauingenieurwesen
5406     value: F35
5407     - description: International Business (Praxissemester)
5408     value: G35
5409     - description: Finanz- und Versicherungsmathematik
5410     value: H35

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5411 - description: Designmanagement  
 5412 value: I35  
 5413 - description: Internationale Beziehungen  
 5414 value: J35  
 5415 - description: Deutsch  
 5416 value: '036'  
 5417 - description: Public Administration (European Studies)  
 5418 value: A36  
 5419 - description: Stadtbauwesen und Stadtverkehr  
 5420 value: B36  
 5421 - description: Language, Text and Information  
 5422 value: C36  
 5423 - description: Praktische Philosophie  
 5424 value: D36  
 5425 - description: Sportmanagement und Kommunikation  
 5426 value: E36  
 5427 - description: Wirtschaftsingenieurwesen / Elektrische Energietechnik  
 5428 value: F36  
 5429 - description: Bibliothekswissenschaft (Praxissemester)  
 5430 value: G36  
 5431 - description: Psychosoziale Beratung  
 5432 value: H36  
 5433 - description: Arabisch  
 5434 value: I36  
 5435 - description: Osteopathie  
 5436 value: J36  
 5437 - description: Editions- und Dokumentwissenschaft  
 5438 value: '037'  
 5439 - description: European Studies  
 5440 value: A37  
 5441 - description: Versorgungs- und Entsorgungstechnik (KIA)  
 5442 value: B37  
 5443 - description: Orchesterspiel  
 5444 value: C37  
 5445 - description: Arbeits- und Organisationspsychologie  
 5446 value: D37  
 5447 - description: Antike Sprachen und Kulturen  
 5448 value: E37  
 5449 - description: Wirtschaftsingenieurwesen / Werkstoff- und Prozesstechnik  
 5450 value: F37  
 5451 - description: International Business Studies (IBS) (8 Semester)  
 5452 value: G37  
 5453 - description: Medienproduktion extern  
 5454 value: H37  
 5455 - description: Bengalisch  
 5456 value: I37  
 5457 - description: Medical Engineering  
 5458 value: J37  
 5459 - description: Chemie (Research School of Chemistry)  
 5460 value: A38  
 5461 - description: Sprache und Kommunikation  
 5462 value: B38  
 5463 - description: Life Science Technologies  
 5464 value: C38  
 5465 - description: Management  
 5466 value: D38  
 5467 - description: Deutsche Sprache und Literatur  
 5468 value: E38  
 5469 - description: Business Administration (WBSTG)  
 5470 value: F38  
 5471 - description: Communication and Multimediadesign (Praxissemester)  
 5472 value: G38  
 5473 - description: Versorgungstechnik (Praxissemester)

5474       value: H38  
 5475       - description: Hindi  
 5476       value: I38  
 5477       - description: IT-Management und Softwaretechnik  
 5478       value: J38  
 5479       - description: Katholische Theologie (ABSTG)  
 5480       value: A39  
 5481       - description: Social Science  
 5482       value: B39  
 5483       - description: Klinische Psychologie  
 5484       value: C39  
 5485       - description: Mediation  
 5486       value: D39  
 5487       - description: Ethnologie  
 5488       value: E39  
 5489       - description: Steuerrecht  
 5490       value: F39  
 5491       - description: Medizinische Informatik (Praxissemester)  
 5492       value: G39  
 5493       - description: Umwelttechnik (Praxissemester)  
 5494       value: H39  
 5495       - description: Indonesisch  
 5496       value: I39  
 5497       - description: Materialwissenschaft und Denkmalpflege  
 5498       value: J39  
 5499       - description: Informatik (Elektrotechnik)  
 5500       value: A40  
 5501       - description: Vergleichende Sozialwissenschaften  
 5502       value: B40  
 5503       - description: Soziale Arbeit  
 5504       value: C40  
 5505       - description: Ethik  
 5506       value: D40  
 5507       - description: "Europ\xE4ische Arch\xE4ologie"  
 5508       value: E40  
 5509       - description: Corporate Management  
 5510       value: F40  
 5511       - description: IT- und Software-Systeme extern  
 5512       value: G40  
 5513       - description: "Geb\xE4udeautomation extern"  
 5514       value: H40  
 5515       - description: Mongolistik  
 5516       value: I40  
 5517       - description: International Digital Management  
 5518       value: J40  
 5519       - description: "Blindenp\xE4dagogik (Zstg)"  
 5520       value: 'O41'  
 5521       - description: "Kulturp\xE4dagogik"  
 5522       value: A41  
 5523       - description: Malerei  
 5524       value: B41  
 5525       - description: Book Studies  
 5526       value: C41  
 5527       - description: Rechtswissenschaft (WBSTG mit 4 Semestern)  
 5528       value: D41  
 5529       - description: "Europ\xE4ische Rechtslinguistik"  
 5530       value: E41  
 5531       - description: Biotechnologie (Praxissemester)  
 5532       value: F41  
 5533       - description: Extended Ecumenical Studies  
 5534       value: G41  
 5535       - description: Globale Gesundheit  
 5536       value: H41

5537 - description: Persisch  
 5538 value: I41  
 5539 - description: Orientierungsstudium Gesellschaftswissenschaften  
 5540 value: J41  
 5541 - description: Gesundheitstechnik  
 5542 value: A42  
 5543 - description: Eurythmie  
 5544 value: B42  
 5545 - description: Economics and Law  
 5546 value: C42  
 5547 - description: Peace Studies  
 5548 value: D42  
 5549 - description: Linguistik und Phonetik  
 5550 value: E42  
 5551 - description: Psychosoziale Beratung und Mediation  
 5552 value: F42  
 5553 - description: Public Management  
 5554 value: G42  
 5555 - description: Immunologie und Infektiologie  
 5556 value: H42  
 5557 - description: Vietnamesisch  
 5558 value: I42  
 5559 - description: Orientierungsstudium MINT  
 5560 value: J42  
 5561 - description: Maschinentechnik (Praxissemester)  
 5562 value: A43  
 5563 - description: Computermathematik  
 5564 value: B43  
 5565 - description: Islamische Theologie, - Religionslehre  
 5566 value: C43  
 5567 - description: Personzentrierte Beratung  
 5568 value: D43  
 5569 - description: Niederlandistik  
 5570 value: E43  
 5571 - description: Soziale Inklusion, Gesundheit und Bildung  
 5572 value: F43  
 5573 - description: Wirtschaft und Kommunikation  
 5574 value: G43  
 5575 - description: Integrierte Architektur  
 5576 value: H43  
 5577 - description: Geschichte und Kultur Europas und Ostasiens  
 5578 value: I43  
 5579 - description: Sonstiges Orientierungsstudium  
 5580 value: J43  
 5581 - description: Gestaltung  
 5582 value: '044'  
 5583 - description: Rohstoffe und Geotechnik (berufsbegleitend)  
 5584 value: A44  
 5585 - description: Wissenschaftsjournalismus  
 5586 value: B44  
 5587 - description: "\xD6konomik"  
 5588 value: C44  
 5589 - description: Engineering  
 5590 value: D44  
 5591 - description: Skandinavistik / Fennistik  
 5592 value: E44  
 5593 - description: Krankenversicherungsmanagement (berufsbegleitend)  
 5594 value: F44  
 5595 - description: Beratung im Gesundheits-, Sozial- und Bildungswesen  
 5596 value: G44  
 5597 - description: "Gesundheitsp\xE4dagogik"  
 5598 value: H44  
 5599 - description: Aquatische Biologie

```

5600     value: I44
5601     - description: "\xD6ffentliche Sicherheit"
5602     value: J44
5603     - description: "Erziehungsschwierigenp\xE4d. (ZSTG)"
5604     value: '045'
5605     - description: Verfahrenstechnik (berufsbegleitend)
5606     value: A45
5607     - description: Datenwissenschaft / Data Science
5608     value: B45
5609     - description: Politik und Recht
5610     value: C45
5611     - description: Anglistik und Amerikanistik
5612     value: D45
5613     - description: Sprachen und Kulturen Afrikas
5614     value: E45
5615     - description: Marketingmanagement
5616     value: F45
5617     - description: Public Governance across Borders
5618     value: G45
5619     - description: Management regenerativer Energien
5620     value: H45
5621     - description: Informatik (VBSTG)
5622     value: I45
5623     - description: Computerlinguistik
5624     value: J45
5625     - description: Projektmanagement (Bauingenieurwesen)
5626     value: '046'
5627     - description: Technologie- und Ressourcenmanagement in den Tropen und Subtropen
5628     value: A46
5629     - description: Textil- und Bekleidungstechnik (Praxissemester)
5630     value: B46
5631     - description: Islamwissenschaft / Arabistik
5632     value: C46
5633     - description: Astrophysik
5634     value: D46
5635     - description: Sprachen und Kulturen der islamischen Welt
5636     value: E46
5637     - description: Marketingmanagement (berufsbegleitend)
5638     value: F46
5639     - description: Heilerziehungspflege
5640     value: G46
5641     - description: Wissenschaftsphilosophie
5642     value: H46
5643     - description: "Berufsp\xE4dagogik, Beratung/Management und Forschung im Gesundheitswesen"
5644     value: I46
5645     - description: Gerontologie
5646     value: J46
5647     - description: Wirtschaftsrecht (Praxissemester)
5648     value: '047'
5649     - description: Maschinenbau (Deutsch-Chilenisch)
5650     value: A47
5651     - description: Chemie mit Materialwissenschaften
5652     value: B47
5653     - description: Arabische Sprache und Literatur
5654     value: C47
5655     - description: "\xC4sthetische Kommunikation - Musikwissenschaft"
5656     value: D47
5657     - description: Schulleitungsmanagement (WBSTG)
5658     value: E47
5659     - description: Ehe-, Familien- und Lebensberatung extern
5660     value: F47
5661     - description: Soziale Nachhaltigkeit und demografischer Wandel
5662     value: G47

```



5663 - description: Medienpsychologie  
 5664 value: H47  
 5665 - description: Betriebliches Gesundheitsmanagement  
 5666 value: I47  
 5667 - description: Sustainability Management  
 5668 value: J47  
 5669 - description: Elektrotechnik  
 5670 value: O48  
 5671 - description: Health Communication  
 5672 value: A48  
 5673 - description: Nuclear Applications  
 5674 value: B48  
 5675 - description: International Project Engineering and Management  
 5676 value: C48  
 5677 - description: Economics  
 5678 value: D48  
 5679 - description: Corporate Finance  
 5680 value: E48  
 5681 - description: European Regulation of Network Industries (WBSTG)  
 5682 value: F48  
 5683 - description: Sport- und Gesundheitstechnik  
 5684 value: G48  
 5685 - description: Digitales Produktdesign  
 5686 value: H48  
 5687 - description: Pflegewissenschaft/-management (VBSTG)  
 5688 value: I48  
 5689 - description: Wirtschaft-Politik  
 5690 value: J48  
 5691 - description: Englisch  
 5692 value: O49  
 5693 - description: Katholische Kirchenmusik (ABSTG)  
 5694 value: A49  
 5695 - description: "Europ\xe4ische Moderne"  
 5696 value: B49  
 5697 - description: "Elektrotechnik f\xFCr Energie, Licht, Automation"  
 5698 value: C49  
 5699 - description: English Studies  
 5700 value: D49  
 5701 - description: "Antike Kulturen des \xF6stlichen Mittelmeerraumes"  
 5702 value: E49  
 5703 - description: European Multimedia Arts and Cultural Heritage Studies  
 5704 value: F49  
 5705 - description: Medizin / Versuchstierkunde extern  
 5706 value: G49  
 5707 - description: Anwaltsrecht  
 5708 value: H49  
 5709 - description: "\xD6konometrie"  
 5710 value: I49  
 5711 - description: Wirtschaft-Politik/Sozialwissenschaften  
 5712 value: J49  
 5713 - description: Geographie  
 5714 value: 'O50'  
 5715 - description: Evangelische Kirchenmusik  
 5716 value: A50  
 5717 - description: Politikwissenschaft, Verwaltungswissenschaft, Soziologie  
 5718 value: B50  
 5719 - description: Biophysik  
 5720 value: C50  
 5721 - description: "Geod\xe4sie und Geoinformation"  
 5722 value: D50  
 5723 - description: Chinastudien  
 5724 value: E50  
 5725 - description: Culture and Environment in Africa

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5726     value: F50
5727     - description: Gesundheit und Diversity
5728     value: G50
5729     - description: Wirtschaftsingenieurwesen - WiwiS (WBSTG)
5730     value: H50
5731     - description: Internationales Logistikmanagement
5732     value: I50
5733     - description: Verwaltungswissenschaften
5734     value: J50
5735     - description: "Erziehungsschwierigenp\xE4dagogik"
5736     value: '051'
5737     - description: Evangelische Kirchenmusik (ABSTG)
5738     value: A51
5739     - description: Governance (Politische Steuerung und Koordination)
5740     value: B51
5741     - description: Genome Based Systems Biology
5742     value: C51
5743     - description: Germanistik, Vergleichende Literatur- und Kulturwissenschaft
5744     value: D51
5745     - description: Komparatistik / Kulturpoetik
5746     value: E51
5747     - description: Naturwissenschaftliche Forensik
5748     value: F51
5749     - description: Mathematische und Theoretische Physik
5750     value: G51
5751     - description: Biologie International
5752     value: H51
5753     - description: "P\xE4dagogik der fr\xFChen Kindheit"
5754     value: I51
5755     - description: "Kulturwissenschaft (k\xFCnstlerischer Schwerpunkt)"
5756     value: J51
5757     - description: "P\xE4dagogik"
5758     value: '052'
5759     - description: Soziale Arbeit (Beratung und Management)
5760     value: A52
5761     - description: Individualisierung und sozialer Wandel
5762     value: B52
5763     - description: History, Philosophy and Sociology of Science
5764     value: C52
5765     - description: Griechische und Lateinische Literatur der Antike
5766     value: D52
5767     - description: Musikpraxis und neue Medien
5768     value: E52
5769     - description: Management kleiner und mittlerer Unternehmen
5770     value: F52
5771     - description: "Medizin p\xE4dagogik"
5772     value: G52
5773     - description: Quantitative Biologie
5774     value: H52
5775     - description: Landschaftsbau
5776     value: I52
5777     - description: BWL und E-Commerce
5778     value: J52
5779     - description: Evangelische Theologie, - Religionslehre
5780     value: '053'
5781     - description: Molekularbiologie (Graduate School)
5782     value: A53
5783     - description: Technische Informatik (Praxissemester)
5784     value: B53
5785     - description: Molecular Cell Biology
5786     value: C53
5787     - description: "Kunstgeschichte und Arch\xE4ologie"
5788     value: D53

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5789 - description: National and Transnational Literature and Culture  
 5790 value: E53  
 5791 - description: Controlling und Risikomanagement  
 5792 value: F53  
 5793 - description: "Waldorfp\xE4dagogik"  
 5794 value: G53  
 5795 - description: IT-Management  
 5796 value: H53  
 5797 - description: Konstruktion und Robotik  
 5798 value: I53  
 5799 - description: Regenerative Energiesysteme  
 5800 value: J53  
 5801 - description: Film und Fernsehwissenschaft  
 5802 value: '054'  
 5803 - description: Angewandte Materialwissenschaft  
 5804 value: A54  
 5805 - description: Kulturwissenschaften  
 5806 value: B54  
 5807 - description: Nanowissenschaften  
 5808 value: C54  
 5809 - description: Medienkommunikation  
 5810 value: D54  
 5811 - description: IT-Automotive  
 5812 value: E54  
 5813 - description: Produktions- und Kunststofftechnik  
 5814 value: F54  
 5815 - description: Wirtschaftsingenieurwesen / Mensch-Maschine-Systeme  
 5816 value: G54  
 5817 - description: Wasserressourcenmanagement extern  
 5818 value: H54  
 5819 - description: Produktionstechnik extern  
 5820 value: I54  
 5821 - description: Experimentelle Psychologie und Neurowissenschaft  
 5822 value: J54  
 5823 - description: Druck- und Medientechnologie  
 5824 value: A55  
 5825 - description: Elektrotechnik und Informationstechnik (Praxissemester)  
 5826 value: B55  
 5827 - description: Sport - Organisationsentwicklung und Management  
 5828 value: C55  
 5829 - description: Politik und Gesellschaft  
 5830 value: D55  
 5831 - description: Journalistik  
 5832 value: E55  
 5833 - description: Optimierung und Simulation  
 5834 value: F55  
 5835 - description: Wissenschaftsforschung  
 5836 value: G55  
 5837 - description: Internationales Wasserressourcenmanagement  
 5838 value: H55  
 5839 - description: Medizinische Informatik extern  
 5840 value: I55  
 5841 - description: Klinische Psychologie und Psychotherapie  
 5842 value: J55  
 5843 - description: Angewandte Informatik  
 5844 value: '056'  
 5845 - description: Immobilien- und Infrastrukturmanagement (WBSTG)  
 5846 value: A56  
 5847 - description: Automation und Information  
 5848 value: B56  
 5849 - description: "Sport - Pr\xE4vention und Intervention"  
 5850 value: C56  
 5851 - description: Sprachlernforschung

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5852     value: D56
5853     - description: Polymerwissenschaften
5854     value: E56
5855     - description: Bildung und Medien
5856     value: F56
5857     - description: "Sonderp\xE4dagogik Inklusion"
5858     value: G56
5859     - description: Umwelttechnik und Ressourcenmanagement International
5860     value: H56
5861     - description: Digital Business
5862     value: I56
5863     - description: IT-Sicherheit
5864     value: J56
5865     - description: Kulturmanagement
5866     value: '057'
5867     - description: Musical
5868     value: A57
5869     - description: Architektur - Mediamanagement
5870     value: B57
5871     - description: Neurobiologie
5872     value: C57
5873     - description: Sprachliche Kommunikation
5874     value: D57
5875     - description: Spatial Planning in Europe
5876     value: E57
5877     - description: Sport, Medien und Kommunikationsforschung
5878     value: F57
5879     - description: "Bildungswissenschaften / Integrierte SoP\xE4d"
5880     value: G57
5881     - description: Umwelttechnik und Ressourcenmanagement extern
5882     value: H57
5883     - description: "Steuern und Wirtschaftspr\xFCfung extern"
5884     value: I57
5885     - description: Tiefbau
5886     value: J57
5887     - description: Organisationsmanagement
5888     value: 058
5889     - description: Schauspielregie
5890     value: A58
5891     - description: "Philosophie - Philosophie im europ\xE4ischen Kontext"
5892     value: B58
5893     - description: Transnational ecosystem-based Water Management
5894     value: C58
5895     - description: Internationales Infrastruktur- und Facility Management
5896     value: D58
5897     - description: Fahrzeugtechnik (Praxissemester)
5898     value: E58
5899     - description: "Elementarp\xE4dagogik"
5900     value: F58
5901     - description: Technik- und Unternehmensmanagement (VBSTG)
5902     value: G58
5903     - description: Pflege extern
5904     value: H58
5905     - description: Musik- und Filminformatik
5906     value: I58
5907     - description: Musikmanagement
5908     value: J58
5909     - description: "Franz\xF6sisch"
5910     value: 059
5911     - description: Pantomime
5912     value: A59
5913     - description: Wirtschaftsingenieurwesen (ZSTG)
5914     value: B59

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5915 - description: Medienkulturanalyse  
 5916 value: C59  
 5917 - description: "\xD6kologie (Biologie)"  
 5918 value: D59  
 5919 - description: Produktion und Logistik (Praxissemester)  
 5920 value: E59  
 5921 - description: Grundlagen der Werkstofftechnik (Technik-Kommunikation)  
 5922 value: F59  
 5923 - description: Bio- und Nanotechnologien (Praxissemester)  
 5924 value: G59  
 5925 - description: Film extern  
 5926 value: H59  
 5927 - description: Bauingenieurwesen/Ingenieurbau (Orientierungssemester)  
 5928 value: I59  
 5929 - description: "Immobilien- und Geb\xE4udemanagement"  
 5930 value: J59  
 5931 - description: Umwelttechnik und Ressourcenmanagement  
 5932 value: '060'  
 5933 - description: Wirtschaftswissenschaften  
 5934 value: A60  
 5935 - description: Metallurgie und Werkstofftechnik (Praxissemester)  
 5936 value: B60  
 5937 - description: Jiddistik  
 5938 value: C60  
 5939 - description: Intelligente Systeme  
 5940 value: D60  
 5941 - description: Verfahrenstechnik und Versorgungstechnik (Praxissemester)  
 5942 value: E60  
 5943 - description: Kulturerbe  
 5944 value: F60  
 5945 - description: Rechtswissenschaft extern  
 5946 value: G60  
 5947 - description: Wirtschafts- und Sozialwissenschaft extern  
 5948 value: H60  
 5949 - description: Holzbau (Orientierungssemester)  
 5950 value: I60  
 5951 - description: Digitalisierungsrecht  
 5952 value: J60  
 5953 - description: Automatisierungstechnik und Robotik (ASTG)  
 5954 value: '061'  
 5955 - description: Internationales Management  
 5956 value: A61  
 5957 - description: Facility Management  
 5958 value: B61  
 5959 - description: Antike Kultur  
 5960 value: C61  
 5961 - description: "P\xE4dagogik und Management in der Sozialen Arbeit"  
 5962 value: D61  
 5963 - description: Orientalische und Asiatische Sprachen  
 5964 value: E61  
 5965 - description: Toxikologie  
 5966 value: F61  
 5967 - description: Sicherheitsmanagement  
 5968 value: G61  
 5969 - description: Sozialversicherung extern  
 5970 value: H61  
 5971 - description: Wirtschaftsingenieurwesen / Biomedizinische Technik  
 5972 value: I61  
 5973 - description: Theoretische Medizin  
 5974 value: J61  
 5975 - description: "Geh\xF6rlosenp\xE4dagogik"  
 5976 value: '062'  
 5977 - description: Environmental Planning and Management

```

5978     value: A62
5979     - description: Angewandte Informatik - Ingwiss. allg.
5980     value: B62
5981     - description: Georessourcenmanagement
5982     value: C62
5983     - description: Mechatronische Systeme
5984     value: D62
5985     - description: Tibetologie
5986     value: E62
5987     - description: Personalmanagement
5988     value: F62
5989     - description: Sportwissenschaft / Golf
5990     value: G62
5991     - description: Wirtschaftsingenieurwesen - Wiwi extern
5992     value: H62
5993     - description: Wirtschaftsingenieurwesen / Physikalische Technologien und Lastertechnik
5994     value: I62
5995     - description: Wirtschaft & Philosophie
5996     value: J62
5997     - description: "Geistigbehinderten-P\xE4dagogik"
5998     value: '063'
5999     - description: Elektrotechnik und Informationstechnik (berufsbegleitend)
6000     value: A63
6001     - description: Finance
6002     value: B63
6003     - description: Germanistische und Allgemeine Literaturwissenschaft
6004     value: C63
6005     - description: Business Studies
6006     value: D63
6007     - description: "Geschichte und Kultur West- und S\xFCdasiens"
6008     value: E63
6009     - description: European Business Programme
6010     value: F63
6011     - description: Medizinisch-physikalische Technik extern
6012     value: G63
6013     - description: Fertigungs-/Produktionstechnik extern
6014     value: H63
6015     - description: Implantologie und Zahnchirurgie extern
6016     value: I63
6017     - description: Digitale Agrarwirtschaft
6018     value: J63
6019     - description: Kommunikationswissenschaft (Technik-Kommunikation)
6020     value: '064'
6021     - description: Bauingenieurwesen (kooperativ)
6022     value: A64
6023     - description: Financial Information Systems
6024     value: B64
6025     - description: Rohstoffingenieurwesen
6026     value: C64
6027     - description: Informationstechnik (kooperativ)
6028     value: D64
6029     - description: Religionen und Kunst in den Kulturen Asiens
6030     value: E64
6031     - description: Kindheit, Jugend, Soziale Dienste
6032     value: F64
6033     - description: Dentalhygiene
6034     value: G64
6035     - description: Wirtschaftsingenieurwesen - Ing extern
6036     value: H64
6037     - description: Parodontologie extern
6038     value: I64
6039     - description: Mund-, Kiefer-, Gesichtschirurgie
6040     value: J64

```

6041 - description: Geologie  
 6042 value: '065'  
 6043 - description: "Bilingualer Unterricht - Franz\xF6sisch (ZSTG)"  
 6044 value: A65  
 6045 - description: Politische Kommunikation  
 6046 value: B65  
 6047 - description: Sprach- und Kommunikationswissenschaft  
 6048 value: C65  
 6049 - description: Service-Management  
 6050 value: D65  
 6051 - description: Kulturen und Gesellschaften Asiens  
 6052 value: E65  
 6053 - description: Automation & IT  
 6054 value: F65  
 6055 - description: Marketing und Vertrieb  
 6056 value: G65  
 6057 - description: Zahnmedizin extern  
 6058 value: H65  
 6059 - description: "Restaurative und \xE4sthetische Zahnmedizin extern"  
 6060 value: I65  
 6061 - description: Internationale Rechtswissenschaft  
 6062 value: J65  
 6063 - description: Geophysik  
 6064 value: '066'  
 6065 - description: "Tanzp\xE4dagogik"  
 6066 value: A66  
 6067 - description: "Qualit\xE4tsingenieurwesen"  
 6068 value: B66  
 6069 - description: Volkswirtschaftslehre und Wirtschaftsgeschichte  
 6070 value: C66  
 6071 - description: Law and Economics of Change Management  
 6072 value: D66  
 6073 - description: Regionalstudien China  
 6074 value: E66  
 6075 - description: "P\xE4dagogik der Kindheit und Familienbildung"  
 6076 value: F66  
 6077 - description: Internationales Luftverkehrsmanagement  
 6078 value: G66  
 6079 - description: Prozesstechnik extern  
 6080 value: H66  
 6081 - description: "Kieferorthop\xE4die extern"  
 6082 value: I66  
 6083 - description: Handelsmanagement extern  
 6084 value: J66  
 6085 - description: Germanistik  
 6086 value: '067'  
 6087 - description: Kommunikations- und Medienwissenschaft  
 6088 value: A67  
 6089 - description: Brandschutz  
 6090 value: B67  
 6091 - description: Chemie-Verfahrenstechnik  
 6092 value: C67  
 6093 - description: Verkehrslogistik  
 6094 value: D67  
 6095 - description: Regionalstudien Ost- und Mitteleuropa  
 6096 value: E67  
 6097 - description: Medienrecht und Medienwirtschaft  
 6098 value: F67  
 6099 - description: International Marketing Management  
 6100 value: G67  
 6101 - description: Arbeitsrecht extern  
 6102 value: H67  
 6103 - description: Gerontotherapie

```

6104     value: I67
6105     - description: Sportmanagement extern
6106     value: J67
6107     - description: Geschichte
6108     value: O68
6109     - description: Papyrologie, Epigraphik und Numismatik der Antike
6110     value: A68
6111     - description: "Berufsp\xE4dagogik im Gesundheitswesen"
6112     value: B68
6113     - description: "Fach\xFCbersetzen"
6114     value: C68
6115     - description: Business and Management Studies
6116     value: D68
6117     - description: Applied Art and Design
6118     value: E68
6119     - description: Produktdesign und Prozessentwicklung
6120     value: F68
6121     - description: International Human Resource Management
6122     value: G68
6123     - description: Erbrecht extern
6124     value: H68
6125     - description: Schmerztherapie
6126     value: I68
6127     - description: Psychologie mit Schwerpunkt Arbeit und Gesundheit
6128     value: J68
6129     - description: Grundlagen der Informatik (Technik-Kommunikation)
6130     value: O69
6131     - description: Medienwissenschaft / Medienmanagement
6132     value: A69
6133     - description: Pflege- und Gesundheitsmanagement
6134     value: B69
6135     - description: Communication and Media Management
6136     value: D69
6137     - description: "Kultur, \xC4sthetik, Medien (Teilzeit)"
6138     value: E69
6139     - description: Exhibition Design
6140     value: F69
6141     - description: Biomedizinische Betriebswirtschaft
6142     value: G69
6143     - description: Immobilienrecht extern
6144     value: H69
6145     - description: Global Studies
6146     value: I69
6147     - description: Optoelektronik extern
6148     value: J69
6149     - description: Griechische Philologie / Griechisch
6150     value: 'O70'
6151     - description: Wirtschaftsjurist (WBSTG)
6152     value: A70
6153     - description: Imaging Physics
6154     value: B70
6155     - description: Angewandte Geographie
6156     value: C70
6157     - description: Sport & Event Management
6158     value: D70
6159     - description: "Sozialarbeit / Sozialp\xE4dagogik (Teilzeit)"
6160     value: E70
6161     - description: Zukunftsenergien
6162     value: F70
6163     - description: Angewandte Informatik (VBSTG)
6164     value: G70
6165     - description: Medizinrecht extern
6166     value: H70

```



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6167 - description: Methoden der Geschichtswissenschaft
6168 value: I70
6169 - description: "Ern\xE4hrungs- und Haushaltswissenschaft"
6170 value: '071'
6171 - description: Religionswissenschaft
6172 value: A71
6173 - description: "Rechtswissenschaft (Deutsch / T\xFCrkisch)"
6174 value: B71
6175 - description: Angewandte Geowissenschaften
6176 value: C71
6177 - description: Regionale Geographie
6178 value: D71
6179 - description: Fotografie
6180 value: E71
6181 - description: Transport Management
6182 value: F71
6183 - description: Rechtswissenschaft (Deutsch | Italienisch)
6184 value: G71
6185 - description: Versicherungsrecht extern
6186 value: H71
6187 - description: Arbeits- und Organisationspsychologie extern
6188 value: I71
6189 - description: Zolldienst
6190 value: J71
6191 - description: "Ern\xE4hrung und Hauswirtschaft"
6192 value: '072'
6193 - description: Business Studies / Anglophone Countries
6194 value: A72
6195 - description: Bauingenieurwesen extern
6196 value: B72
6197 - description: "Betriebsp\xE4dagogik und Wissenspsychologie"
6198 value: C72
6199 - description: International Management with Engineering
6200 value: D72
6201 - description: Nano- und Materialwissenschaften
6202 value: E72
6203 - description: Dentaltechnologie
6204 value: F72
6205 - description: Sportrecht
6206 value: G72
6207 - description: Wirtschaftsrecht extern
6208 value: H72
6209 - description: Nachhaltige Landschaftsentwicklung
6210 value: I72
6211 - description: Betriebswirtschaft - Commerce International
6212 value: A73
6213 - description: Versicherungswesen extern
6214 value: B73
6215 - description: Angewandte Polymerwissenschaften
6216 value: C73
6217 - description: Wirtschaftsingenieurwesen - Elektrotechnik
6218 value: D73
6219 - description: Business Administration (berufsbegleitend)
6220 value: E73
6221 - description: Evaluation
6222 value: F73
6223 - description: Sportwissenschaft/Analyse
6224 value: G73
6225 - description: Organisationsmanagement extern
6226 value: H73
6227 - description: Medizinische Forschung
6228 value: I73
6229 - description: Grundlagen des Maschinenbaus (Technik-Kommunikation)

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6230     value: '074'
6231     - description: Kommunikations- und Multimediamanagement
6232     value: A74
6233     - description: Lernen
6234     value: B74
6235     - description: European Business Programme (EBP)
6236     value: C74
6237     - description: Business Administration with Informatics
6238     value: D74
6239     - description: Design- und Projektmanagement
6240     value: E74
6241     - description: Management and Technology of Water and Wastewater
6242     value: F74
6243     - description: Sound
6244     value: G74
6245     - description: Ethik extern
6246     value: H74
6247     - description: Angewandte Informatik / Komm.-Technik extern
6248     value: I74
6249     - description: Grundlagen der Elektrotechnik (Technik-Kommunikation)
6250     value: '075'
6251     - description: "Medizin - \xD6konomie"
6252     value: A75
6253     - description: Emotionale und soziale Entwicklung
6254     value: B75
6255     - description: Bildungswissenschaft
6256     value: C75
6257     - description: Zahnmedizin (WBSTG)
6258     value: D75
6259     - description: Betriebswirtschaft/ Wirtschaftsrecht (VBSTG)
6260     value: E75
6261     - description: Immobilienmanagement
6262     value: F75
6263     - description: Sozialwissenschaften in Europa
6264     value: G75
6265     - description: Energiewirtschaft extern
6266     value: H75
6267     - description: Slavery Studies
6268     value: I75
6269     - description: "Medizin - \xD6konomie (berufsbegleitend)"
6270     value: A76
6271     - description: Geistige Entwicklung
6272     value: B76
6273     - description: Corporate Banking
6274     value: C76
6275     - description: Apparative Biotechnologie
6276     value: D76
6277     - description: Mechatronische Systeme / Elektrotechnik (VBSTG)
6278     value: E76
6279     - description: "\xD6ffentliche Verwaltung - Polizeimanagement"
6280     value: F76
6281     - description: Chemie extern
6282     value: G76
6283     - description: Psychologie extern
6284     value: H76
6285     - description: Anthropologie (Humanbiologie)
6286     value: I76
6287     - description: Technische Grundlagen der Georessourcen und Materialtechnik
        (Technik-Kommunikation)
6288     value: '077'
6289     - description: "Medizin - \xD6konomie (ausbildungsbegleitend)"
6290     value: A77
6291     - description: "K\xF6rperliche und motorische Entwicklung"

```

6292       value: B77  
 6293       - description: Kunst (Ein-Fach)  
 6294       value: C77  
 6295       - description: International Studies in Management  
 6296       value: D77  
 6297       - description: Wirtschaftsingenieurwesen / Chemietechnik  
 6298       value: E77  
 6299       - description: Pharma Management  
 6300       value: F77  
 6301       - description: Planetologie  
 6302       value: G77  
 6303       - description: "Erwachsenenbildung und au\xDFerschulische Jugendbildung extern"  
 6304       value: H77  
 6305       - description: "Brauwesen/Getr\xE4nketeknologie"  
 6306       value: I77  
 6307       - description: Indologie und Tamilstik  
 6308       value: O78  
 6309       - description: Computer Aided Process Engineering  
 6310       value: A78  
 6311       - description: Sehen  
 6312       value: B78  
 6313       - description: Gender Studies  
 6314       value: C78  
 6315       - description: Bildung und Erziehung im Kindesalter  
 6316       value: D78  
 6317       - description: Wirtschaftsingenieurwesen / Maschinenbau  
 6318       value: E78  
 6319       - description: Druck- und Medientechnologie (kooperativ)  
 6320       value: F78  
 6321       - description: Biomechatronik  
 6322       value: G78  
 6323       - description: "Philosophie, Politik und \xD6konomik"  
 6324       value: H78  
 6325       - description: "D\xE4nisch"  
 6326       value: I78  
 6327       - description: Informatik  
 6328       value: O79  
 6329       - description: Gewerblicher Rechtsschutz  
 6330       value: A79  
 6331       - description: Sprache  
 6332       value: B79  
 6333       - description: Food and Resource Economics (FRECO)  
 6334       value: C79  
 6335       - description: Tourismus, Catering und Hospitality Services  
 6336       value: D79  
 6337       - description: Wirtschaftsingenieurwesen / Physikalische Technologien  
 6338       value: E79  
 6339       - description: "Management und M\xE4rkte"  
 6340       value: F79  
 6341       - description: Betriebswirtschaftslehre / Marketing extern  
 6342       value: G79  
 6343       - description: "Transkulturalit\xE4t"  
 6344       value: H79  
 6345       - description: Forstwissenschaft, -wirtschaft  
 6346       value: I79  
 6347       - description: Instrumentalmusik  
 6348       value: O80  
 6349       - description: "J\xFCdische Studien"  
 6350       value: A80  
 6351       - description: "H\xF6ren und Kommunikation"  
 6352       value: B80  
 6353       - description: Agrarwissenschaften und Ressourcen-Management in den Tropen und  
 6354       Subtropen (ARTS)

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6355     value: C80
6356     - description: Fahrzeugintegration / Karosserietechnik
6357     value: D80
6358     - description: Informatik (Teilzeit)
6359     value: E80
6360     - description: "Sozialp\xE4dagogik und Management"
6361     value: F80
6362     - description: Media Creation extern
6363     value: G80
6364     - description: Wirtschaftsingenieurwesen - Ing (WBSTG)
6365     value: H80
6366     - description: Gartenbau
6367     value: I80
6368     - description: Journalismus / Public Relations
6369     value: O81
6370     - description: Southeast-Asien-Studies
6371     value: A81
6372     - description: Angewandte Fremdsprachen
6373     value: B81
6374     - description: Kulturanthropologie des Textilen
6375     value: C81
6376     - description: Medienkultur
6377     value: D81
6378     - description: Kommunikationssysteme und Netze
6379     value: E81
6380     - description: Wirtschaftspsychologie (Teilzeit)
6381     value: F81
6382     - description: "Technisches Management in der Energie-, Geb\xE4ude- und Umwelttechnik\
6383       \ extern"
6384     value: G81
6385     - description: Lebenswissenschaften / Ingenieurwesen (VBSTG)
6386     value: H81
6387     - description: Meliorationswesen
6388     value: I81
6389     - description: "Wirtschaft f\xFCr Berufst\xE4tige"
6390     value: O82
6391     - description: Design-Ingenieur
6392     value: A82
6393     - description: Religion in Europe
6394     value: B82
6395     - description: Kunst / Gestalten
6396     value: C82
6397     - description: Deutsch als Zweit- und Fremdsprache / Interkulturelle Kommunikation
6398     value: D82
6399     - description: Werkstoffingenieurwesen
6400     value: E82
6401     - description: Mediendesign (Teilzeit)
6402     value: F82
6403     - description: Kunststofftechnik extern
6404     value: G82
6405     - description: Lichtgestaltung
6406     value: H82
6407     - description: "Transport-/F\xF6rdertechnik"
6408     value: I82
6409     - description: Islamwissenschaft
6410     value: O83
6411     - description: Computer Aided Engineering
6412     value: A83
6413     - description: Visual Studies and Art History
6414     value: B83
6415     - description: Scientific Programming (ausbildungsintegriert)
6416     value: C83
6417     - description: Pharmaceutical Medicine

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6418     value: D83
6419     - description: "Betriebswirtschaft f\xFCr New Public Management (VBSTG)"
6420     value: E83
6421     - description: Angewandte Chemie (Praxissemester)
6422     value: F83
6423     - description: Korrosionsschutztechnik extern
6424     value: G83
6425     - description: Agrartechnologie
6426     value: H83
6427     - description: Holzwirtschaft
6428     value: I83
6429     - description: Italienisch
6430     value: O84
6431     - description: Rettungsingenieurwesen
6432     value: A84
6433     - description: Information Technology
6434     value: B84
6435     - description: Gesundheitsmanagement
6436     value: C84
6437     - description: Wirtschaftswissenschaften (WBSTG, 4semestrig)
6438     value: D84
6439     - description: Fahrzeugelektronik
6440     value: E84
6441     - description: Physikingenieurwesen (Praxissemester)
6442     value: F84
6443     - description: Wirtschaftsingenieurwesen / Maschinenbau extern
6444     value: G84
6445     - description: Naturwissenschaften
6446     value: H84
6447     - description: Iranistik
6448     value: I84
6449     - description: Japanologie
6450     value: O85
6451     - description: Chemie und Biotechnologie
6452     value: A85
6453     - description: Wirtschaftsingenieurwesen - Elektrotechnik (Praxissemester)
6454     value: B85
6455     - description: Media Management
6456     value: C85
6457     - description: Educational Media
6458     value: D85
6459     - description: Risk and Finance
6460     value: E85
6461     - description: Physikingenieurwesen
6462     value: F85
6463     - description: Wirtschaftsingenieurwesen - Elektrotechnik extern
6464     value: G85
6465     - description: Wirtschaftsingenieurwesen / Energie- und Umwelttechnik
6466     value: H85
6467     - description: Wasserbau
6468     value: I85
6469     - description: Katholische Theologie, - Religionslehre
6470     value: O86
6471     - description: Chemie und Biotechnologie (kooperativ)
6472     value: A86
6473     - description: Musik (Ein-Fach)
6474     value: B86
6475     - description: Business Psychology
6476     value: C86
6477     - description: Diakonik - Werteorientiertes Gestalten in Kirche und Diakonie
6478     value: D86
6479     - description: Betriebswirtschaft und Logistik
6480     value: E86

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6481 - description: "Germanistik und Mathematik f\xFCr die Grundschule"
6482   value: F86
6483 - description: International Management with Engineering extern
6484   value: G86
6485 - description: "Wirtschaftsingenieurwesen / Geb\xE4udetechnik"
6486   value: H86
6487 - description: Metalltechnik
6488   value: I86
6489 - description: "K\xF6rperbehinderten-P\xE4dagogik"
6490   value: O87
6491 - description: Angewandte Chemie
6492   value: A87
6493 - description: Metallurgy and Metal Forming
6494   value: B87
6495 - description: Individualisierung und Sozialstruktur
6496   value: C87
6497 - description: Management im Sozial- und Gesundheitswesen
6498   value: D87
6499 - description: Nachhaltiges Bauen und Bewirtschaften
6500   value: E87
6501 - description: "Farbtechnik, Raumgestaltung, Oberfl\xE4chentechnik"
6502   value: F87
6503 - description: Civil Engineering
6504   value: G87
6505 - description: "Biodiversit\xE4t"
6506   value: H87
6507 - description: "Grundschul-/Primarstufenp\xE4dagogik"
6508   value: I87
6509 - description: Kommunikationswissenschaft(en)
6510   value: O88
6511 - description: Algorithmische Mathematik
6512   value: A88
6513 - description: Biowissenschaften
6514   value: B88
6515 - description: Business Economics
6516   value: C88
6517 - description: Mentoring - Beraten und Anleiten im Sozial- und Gesundheitswesen
6518   value: D88
6519 - description: Produktionsmanagement
6520   value: E88
6521 - description: Mediendesign und Designtechnik
6522   value: F88
6523 - description: Power Engineering
6524   value: G88
6525 - description: Religion und Politik
6526   value: H88
6527 - description: "Ausl\xE4nderp\xE4dagogik"
6528   value: I88
6529 - description: Angewandte Informatik im Maschinenbau (Praxissemester)
6530   value: O89
6531 - description: Dynamisch-Vernetzte Intelligente Systeme
6532   value: A89
6533 - description: Joint Studies of Applied Mechatronics
6534   value: B89
6535 - description: General Management
6536   value: C89
6537 - description: Angewandte Philosophie
6538   value: D89
6539 - description: Integriertes Wasserressourcenmanagement
6540   value: E89
6541 - description: Angewandte Naturwissenschaften und Gesundheit
6542   value: F89
6543 - description: Vergleichende Soziologie

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6544       value: G89  
 6545       - description: Interkulturelle Kunstgeschichte  
 6546       value: H89  
 6547       - description: Ozeanographie  
 6548       value: I89  
 6549       - description: Mechatronik (kooperativ)  
 6550       value: O90  
 6551       - description: "Popul\xE4re Musik und Medien"  
 6552       value: A90  
 6553       - description: Sozialversicherung  
 6554       value: B90  
 6555       - description: Tourism and Event Management  
 6556       value: C90  
 6557       - description: Anglophone Studies  
 6558       value: D90  
 6559       - description: Accounting, Auditing and Taxation  
 6560       value: E90  
 6561       - description: Deutsches Recht  
 6562       value: F90  
 6563       - description: "Interreligi\xF6se Dialogkompetenz extern"  
 6564       value: G90  
 6565       - description: Germanistik und Geschichte  
 6566       value: H90  
 6567       - description: Agrarbiologie  
 6568       value: I90  
 6569       - description: Kunst  
 6570       value: O91  
 6571       - description: Komparatistik  
 6572       value: A91  
 6573       - description: Chemische Biologie  
 6574       value: B91  
 6575       - description: Computer Vision and Computational Intelligence  
 6576       value: C91  
 6577       - description: Christliche Studien  
 6578       value: D91  
 6579       - description: Medien und Gesellschaft  
 6580       value: E91  
 6581       - description: Internationales Hotelmanagement  
 6582       value: F91  
 6583       - description: "Intensivp\xE4dagogik"  
 6584       value: G91  
 6585       - description: Personalmanagement (WBSTG)  
 6586       value: H91  
 6587       - description: Abfallwirtschaft  
 6588       value: I91  
 6589       - description: Kunstgeschichte, Kunstwissenschaft  
 6590       value: O92  
 6591       - description: Ostslawistik  
 6592       value: A92  
 6593       - description: Mehrsprachige Kommunikation  
 6594       value: B92  
 6595       - description: "Rehabilitationsp\xE4dagogik"  
 6596       value: C92  
 6597       - description: Contemporary East Asian Studies  
 6598       value: D92  
 6599       - description: Roads to Democracy(ies)  
 6600       value: E92  
 6601       - description: Angewandte Sprachwissenschaft (Teilzeit)  
 6602       value: F92  
 6603       - description: Banking and Sales  
 6604       value: G92  
 6605       - description: "Gesundheitspr\xE4vention"  
 6606       value: H92

6607 - description: Technische Kybernetik  
 6608 value: I92  
 6609 - description: Wirtschaftsinformatik (WBSTG)  
 6610 value: O93  
 6611 - description: Westslawistik  
 6612 value: A93  
 6613 - description: Neurowissenschaften  
 6614 value: B93  
 6615 - description: Dienstleistungsmanagement  
 6616 value: C93  
 6617 - description: "Franz\xF6sische Sprache und Kultur"  
 6618 value: D93  
 6619 - description: Historische Instrumente und Barockgesang  
 6620 value: E93  
 6621 - description: Literaturwissenschaft (Teilzeit)  
 6622 value: F93  
 6623 - description: Management extern  
 6624 value: G93  
 6625 - description: Big Data  
 6626 value: H93  
 6627 - description: Sozialkunde  
 6628 value: I93  
 6629 - description: Biomedical Sciences  
 6630 value: O94  
 6631 - description: Neuroscience (IGS)  
 6632 value: A94  
 6633 - description: Simultaneous Automotive Engineering  
 6634 value: B94  
 6635 - description: Betriebssicherheitsmanagement  
 6636 value: C94  
 6637 - description: 'Germanistik: Sprache, Literatur, Kultur und Kommunikation'  
 6638 value: D94  
 6639 - description: Management of Financial Institutions  
 6640 value: E94  
 6641 - description: Medienwissenschaft (Teilzeit)  
 6642 value: F94  
 6643 - description: Bauingenieurwesen / Netzingenieur  
 6644 value: G94  
 6645 - description: Turkologie  
 6646 value: H94  
 6647 - description: "S\xFCdslawisch (Bulgarisch, Serbokroatisch, Slowenisch usw.)"  
 6648 value: I94  
 6649 - description: Lateinische Philologie / Latein  
 6650 value: O95  
 6651 - description: Wirtschaftspsychologie  
 6652 value: A95  
 6653 - description: Medien-Design  
 6654 value: B95  
 6655 - description: Terminologie und Sprachtechnologie  
 6656 value: C95  
 6657 - description: 'Germanistik: Sprache und Kultur'  
 6658 value: D95  
 6659 - description: Mittelstandsmanagement  
 6660 value: E95  
 6661 - description: Wirtschaftsingenieurwesen - Ing (kooperativ)  
 6662 value: F95  
 6663 - description: "Technische Orthop\xE4die extern"  
 6664 value: G95  
 6665 - description: Produktions- und Logistikmanagement  
 6666 value: H95  
 6667 - description: "Tiermedizin/Veterin\xE4rmedizin"  
 6668 value: I95  
 6669 - description: Lebensmittelchemie



6670 value: 096  
 6671 - description: "Arch\xE4ologische Wissenschaften"  
 6672 value: A96  
 6673 - description: Soziale Arbeit (VBSTG)  
 6674 value: B96  
 6675 - description: Kommunikations-, Multimedia- und Marktmanagement  
 6676 value: C96  
 6677 - description: Internationale Beziehungen und Entwicklungspolitik  
 6678 value: D96  
 6679 - description: Computational Mechanics  
 6680 value: E96  
 6681 - description: Architektur (VBSTG)  
 6682 value: F96  
 6683 - description: Entwicklungszusammenarbeit  
 6684 value: G96  
 6685 - description: Personal- und Organisationsmanagement  
 6686 value: H96  
 6687 - description: Edelstein- und Schmuckdesign  
 6688 value: I96  
 6689 - description: Medienwirtschaft  
 6690 value: 097  
 6691 - description: Geoinformationssysteme  
 6692 value: A97  
 6693 - description: Sales Engineering and Product Management  
 6694 value: B97  
 6695 - description: European Master in Project Management  
 6696 value: C97  
 6697 - description: Japanese Sociolinguistic  
 6698 value: D97  
 6699 - description: Wirtschaftsingenieurwesen (VBSTG)  
 6700 value: E97  
 6701 - description: "Umweltmanagement/Umwelt\xF6konomie"  
 6702 value: F97  
 6703 - description: Infrastrukturmanagement  
 6704 value: G97  
 6705 - description: Betriebswirtschaft (Asien) (VBSTG)  
 6706 value: H97  
 6707 - description: Niederdeutsch  
 6708 value: I97  
 6709 - description: Sport (-wissenschaft)  
 6710 value: 098  
 6711 - description: Bioinformatik  
 6712 value: A98  
 6713 - description: Wirtschaft Ostasiens  
 6714 value: B98  
 6715 - description: Design Medien Kommunikation  
 6716 value: C98  
 6717 - description: Kunst- und Designwissenschaften  
 6718 value: D98  
 6719 - description: Internationale kulturhistorische Studien  
 6720 value: E98  
 6721 - description: Industrial Engineering  
 6722 value: F98  
 6723 - description: International Business Psychology  
 6724 value: G98  
 6725 - description: Maschinenbau (monoedukativ)  
 6726 value: H98  
 6727 - description: Lernbereich Technik  
 6728 value: I98  
 6729 - description: "Lernbehindertenp\xE4dagogik"  
 6730 value: 099  
 6731 - description: Environmental Sciences  
 6732 value: A99

```

6733 - description: Wirtschaft und Politik Ostasiens
6734 value: B99
6735 - description: Szenografie und Kommunikation
6736 value: C99
6737 - description: Literatur und Medienpraxis
6738 value: D99
6739 - description: "The Americas-Las Am\xE9ricas-Les Am\xE9riques"
6740 value: E99
6741 - description: Energiewirtschaft/ Energiemanagement
6742 value: F99
6743 - description: Sportpolitik
6744 value: G99
6745 - description: Biochemie International
6746 value: H99
6747 - description: Sorabistik
6748 value: I99
6749 - description: Linguistik (Sprachwissenschaft)
6750 value: '101'
6751 - description: "Logop\xE4die"
6752 value: '102'
6753 - description: Markscheidewesen
6754 value: '103'
6755 - description: Maschinenbau
6756 value: '104'
6757 - description: Mathematik
6758 value: '105'
6759 - description: Medizin (allgemein)
6760 value: '107'
6761 - description: IT-Sicherheit / Informationstechnik
6762 value: '108'
6763 - description: Medienproduktion
6764 value: '109'
6765 - description: Meteorologie
6766 value: '110'
6767 - description: Mineralogie
6768 value: '111'
6769 - description: Mittellateinische Philologie
6770 value: '112'
6771 - description: Musik
6772 value: '113'
6773 - description: Musikwissenschaft
6774 value: '114'
6775 - description: Computational Engineering
6776 value: '115'
6777 - description: Textilgestaltung
6778 value: '116'
6779 - description: European Culture and Economy
6780 value: '117'
6781 - description: Wirtschaftsinformatik (Praxissemester)
6782 value: '118'
6783 - description: "Niederl\xE4ndische Philologie / Niederl\xE4ndisch"
6784 value: '119'
6785 - description: Skandinavistik
6786 value: '120'
6787 - description: "Gesundheitsp\xE4dagogik extern"
6788 value: '121'
6789 - description: Orientalistik
6790 value: '122'
6791 - description: Industrial Design and Manufacturing
6792 value: '124'
6793 - description: Pharmazie
6794 value: '126'
6795 - description: Philosophie

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6796     value: '127'
6797     - description: Physik
6798     value: '128'
6799     - description: Politologie / politische Wissenschaft
6800     value: '129'
6801     - description: Polnisch
6802     value: '130'
6803     - description: Psychologie
6804     value: '132'
6805     - description: Publizistik, Journalistik
6806     value: '133'
6807     - description: Raumplanung
6808     value: '134'
6809     - description: Rechtswissenschaft
6810     value: '135'
6811     - description: Religionswissenschaft, Vergleichende
6812     value: '136'
6813     - description: Romanistik
6814     value: '137'
6815     - description: Literatur, Kultur, Medien
6816     value: '138'
6817     - description: Russisch
6818     value: '139'
6819     - description: "Sehbehindertenp\xE4dagogik"
6820     value: '140'
6821     - description: Semitistik
6822     value: '141'
6823     - description: Wirtschafts- und Steuerrecht (WBSTG)
6824     value: '142'
6825     - description: Augenoptik
6826     value: '143'
6827     - description: "Schwerh\xF6rigenp\xE4dagogik"
6828     value: '144'
6829     - description: Sinologie
6830     value: '145'
6831     - description: Slawistik
6832     value: '146'
6833     - description: Texttechnologie
6834     value: '147'
6835     - description: Sozialwissenschaft
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6837     - description: Soziologie
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6839     - description: Spanisch
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6841     - description: "Sprachbehindertenp\xE4dagogik"
6842     value: '151'
6843     - description: Allg. und Vergleichende Sprachwissenschaft
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6845     - description: Informatik (Praxissemester)
6846     value: '153'
6847     - description: Medieninformatik
6848     value: '154'
6849     - description: Theaterwissenschaft
6850     value: '155'
6851     - description: Informationstechnologie
6852     value: '156'
6853     - description: Computer Science
6854     value: '157'
6855     - description: "\xDCbersetzen T\xFCrkisch"
6856     value: '158'
6857     - description: Ergotherapie
6858     value: '159'

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6859 - description: Physiotherapie
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6861 - description: Hebammenkunde
6862 value: '161'
6863 - description: Katholische Kirchenmusik
6864 value: '162'
6865 - description: Systems Engineering
6866 value: '165'
6867 - description: Medien und Informationstechnologien in Erziehung, Unterricht und
6868 Bildung (ZSTG)
6869 value: '166'
6870 - description: Engineering and Project Management
6871 value: '167'
6872 - description: Erziehungswissenschaft (Praxissemester)
6873 value: '168'
6874 - description: Bibliotheks- und Informationswissenschaft
6875 value: '169'
6876 - description: Vermessungswesen
6877 value: '171'
6878 - description: Wirtschaftsinformatik (berufsbegleitend)
6879 value: '172'
6880 - description: "V\xF6lkerkunde"
6881 value: '173'
6882 - description: Volkskunde
6883 value: '174'
6884 - description: Volkswirtschaft / -lehre
6885 value: '175'
6886 - description: Betriebswirtschaft (berufsbegleitend)
6887 value: '177'
6888 - description: Wirtschaft, Aufbaustudium f. Ingenieure
6889 value: '179'
6890 - description: "Wirtschaftsp\xE4dagogik"
6891 value: '181'
6892 - description: Spezielle Wirtschaftslehre
6893 value: '182'
6894 - description: Wirtschafts- und Sozialgeschichte
6895 value: '183'
6896 - description: Wirtschaftswissenschaft
6897 value: '184'
6898 - description: Zahnmedizin
6899 value: '185'
6900 - description: "Krankenhausmanagement f\xFCr Fach\xE4rzte (WBSTG)"
6901 value: '186'
6902 - description: Literaturwissenschaft, allgemeine und vergleichende
6903 value: '188'
6904 - description: Sozialmanagement (WBSTG)
6905 value: '189'
6906 - description: "Sonderp\xE4dagogik (allgemein)"
6907 value: '190'
6908 - description: Komposition
6909 value: '191'
6910 - description: Dirigieren
6911 value: '192'
6912 - description: Kirchenmusik
6913 value: '193'
6914 - description: Tonmeister
6915 value: '194'
6916 - description: Studienkolleg
6917 value: '196'
6918 - description: Wirtschaftsingenieurwesen - Ing (Praxissemester)
6919 value: '197'
6920 - description: Judaistik
6921 value: '198'

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6922 - description: Protestant Theology in its Ecumenical Context (WBSTG)
6923 value: '199'
6924 - description: Angewandte Informatik / Komm.-Technik
6925 value: '200'
6926 - description: Technik
6927 value: '201'
6928 - description: "Heilp\xE4dagogik (Praxissemester)"
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6930 - description: Geowissenschaften
6931 value: '204'
6932 - description: Tourismus-, Event- und Hospitalitymanagement
6933 value: '207'
6934 - description: Technische Betriebswirtschaft (berufsbegl.)
6935 value: '208'
6936 - description: "Wirtschaft (Deutsch-Franz\xF6s.)"
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6938 - description: Maschinenbauinformatik (berufsbegleitend)
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6940 - description: Informations- und Kommunikationstechnik (Praxissemester)
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6942 - description: Oecotrophologie (Praxissemester)
6943 value: '214'
6944 - description: Wirtschaftsingenieurwesen (Praxissemester)
6945 value: '215'
6946 - description: Produktentwicklung und Produktion
6947 value: '216'
6948 - description: Produktentwicklung / Mechatronik
6949 value: '218'
6950 - description: Kunststofftechnik
6951 value: '219'
6952 - description: Energy Systems
6953 value: '220'
6954 - description: Public Health
6955 value: '222'
6956 - description: International Studies of Business Administration and Engineering
6957 value: '223'
6958 - description: Physikalische Technik
6959 value: '224'
6960 - description: Textil- und Bekleidungstechnik / -gewerbe
6961 value: '225'
6962 - description: Electrical Engineering
6963 value: '226'
6964 - description: Mechanical Engineering
6965 value: '227'
6966 - description: "Geistigbehinderten-P\xE4dagogik (ZSTG)"
6967 value: '228'
6968 - description: "K\xF6rperbehinderten-P\xE4dagogik (ZSTG)"
6969 value: '229'
6970 - description: Mechanical Engineering with Business
6971 value: '230'
6972 - description: Kommunikationstechnologie - Druck
6973 value: '231'
6974 - description: Wirtschaftsingenieurwesen - Bau
6975 value: '232'
6976 - description: Oecotrophologie
6977 value: '233'
6978 - description: Informations- und Kommunikationstechnik
6979 value: '234'
6980 - description: Mechanical Engineering with Computer Science
6981 value: '235'
6982 - description: Medieninformatik (Praxissemester)
6983 value: '236'
6984 - description: Statistik

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6985     value: '237'
6986     - description: Koreanistik
6987     value: '238'
6988     - description: Volkswirtschaft, sozialwiss. Richtung
6989     value: '239'
6990     - description: "Deutschkursus f\xFCr Ausl\xE4nder"
6991     value: '240'
6992     - description: International Business Administration
6993     value: '241'
6994     - description: Elektrotechnik, international (EEP)
6995     value: '242'
6996     - description: Verwaltungsbetriebswirtschaftslehre (VBSTG) (WBSTG)
6997     value: '243'
6998     - description: Phonetik
6999     value: '244'
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7002     - description: "Fr\xFChp\xE4dagogik (VBSTG)"
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7004     - description: Suchthilfe (WBSTG)
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7006     - description: Photoingenieurwesen und Medientechnik
7007     value: '248'
7008     - description: Architektur (Praxissemester)
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7010     - description: Wirtschaftsrecht (Verbundstdg.)
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7012     - description: Mechatronik extern
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7014     - description: Supervision (WBSTG)
7015     value: '252'
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7017     value: '253'
7018     - description: Banking and Finance
7019     value: '254'
7020     - description: Luftverkehrsmanagement
7021     value: '255'
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7023     value: '256'
7024     - description: Bauingenieurwesen
7025     value: '257'
7026     - description: Communication and Multimediadesign
7027     value: '258'
7028     - description: MCM Marketing Executive Program (WBSTG)
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7033     value: '261'
7034     - description: Wirtschaft (Praxissemester)
7035     value: '262'
7036     - description: Water Science
7037     value: '263'
7038     - description: Chemie / Molekulare Materialien
7039     value: '264'
7040     - description: Angewandte Literatur- und Kulturwissenschaft
7041     value: '265'
7042     - description: Handelsmanagement
7043     value: '266'
7044     - description: Industriemanagement
7045     value: '267'
7046     - description: Information Technology extern
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7051   value: '270'
7052 - description: Geoinformatik
7053   value: '271'
7054 - description: Angewandte Materialtechnik
7055   value: '272'
7056 - description: Erziehungswissenschaft
7057   value: '273'
7058 - description: Tourismus und Travelmanagement
7059   value: '274'
7060 - description: Politikwissenschaft
7061   value: '275'
7062 - description: Sozialpsychologie und -anthropologie
7063   value: '276'
7064 - description: Politik, Wirtschaft und Gesellschaft
7065   value: '277'
7066 - description: Wirtschaftsinformatik (Verbundstdg.)
7067   value: '278'
7068 - description: Fahrzeugtechnik (Verbundstg.)
7069   value: '279'
7070 - description: Linguistik
7071   value: '280'
7072 - description: Chinesische Philosophie und Geschichte
7073   value: '282'
7074 - description: Chinesische Sprache und Literatur
7075   value: '283'
7076 - description: Japanische Linguistik
7077   value: '284'
7078 - description: BWL (Praxissem.)
7079   value: '285'
7080 - description: Japanische Geschichte
7081   value: '286'
7082 - description: Politik Ostasiens
7083   value: '287'
7084 - description: Wirtschaftsinform. (Praxissem.)
7085   value: '288'
7086 - description: Klinische Linguistik
7087   value: '289'
7088 - description: "Sonstige F\xE4cher"
7089   value: '290'
7090 - description: Kulturwissenschaftliche Anthropologie
7091   value: '291'
7092 - description: "Regionalwissenschaft S\xFCdostasien"
7093   value: '292'
7094 - description: Regionalwissenschaft Zentral- und Mittelasien
7095   value: '293'
7096 - description: Elektrotechnik (dual)
7097   value: '294'
7098 - description: Maschinenbau (kooperativ)
7099   value: '295'
7100 - description: "Lernbehindertenp\xE4dagogik (Zstg)"
7101   value: '297'
7102 - description: Bauingenieurwesen (Praxissemester)
7103   value: '298'
7104 - description: Bioingenieurwesen
7105   value: '299'
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7107   value: '300'
7108 - description: Instrumentalmusik (ABSTG)
7109   value: '301'
7110 - description: Baubetriebsmanagement

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7113     value: '305'
7114     - description: "Betriebsp\xE4dagogik"
7115     value: '307'
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7117     value: '308'
7118     - description: E-Tech / Energietechnik (Praxissemester)
7119     value: '309'
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7121     value: '310'
7122     - description: Deutsch-Italienische Studien
7123     value: '312'
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7125     value: '313'
7126     - description: Elektrische Energietechnik
7127     value: '316'
7128     - description: Vertriebsingenieurwesen
7129     value: '317'
7130     - description: Gesang Aufbaustdg.
7131     value: '318'
7132     - description: "Ern\xE4hrungswissenschaft"
7133     value: '320'
7134     - description: "Erwachsenenbildung und au\xDFerschulische Jugendbildung"
7135     value: '321'
7136     - description: Kraftfahrzeugbau
7137     value: '322'
7138     - description: Electrical Power Engineering
7139     value: '323'
7140     - description: Fachspez. Fremdsprachenausb. f. Juristen
7141     value: '324'
7142     - description: Fertigungstechnik
7143     value: '325'
7144     - description: "Wirtschaft Deutsch-Niederl\xE4ndisch"
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7146     - description: Dirigieren Aufbaustdg.
7147     value: '327'
7148     - description: Komposition Aufbaustdg.
7149     value: '328'
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7151     value: '329'
7152     - description: Kammermusik
7153     value: '332'
7154     - description: Hauswirtschaftswissenschaft
7155     value: '333'
7156     - description: Spezielle Agrarwissenschaft
7157     value: '335'
7158     - description: Operations Research und Wirtschaftsinformatik (ZSTG)
7159     value: '336'
7160     - description: Klaviermusik und Begleitung
7161     value: '337'
7162     - description: "Musik\xFCbertragung Zusatzstdg."
7163     value: '338'
7164     - description: "Spezielle Ern\xE4hrungs- und Hauswirtschaftswissenschaft"
7165     value: '339'
7166     - description: Konstruktiver Ingenieurbau
7167     value: '340'
7168     - description: Neue Musik
7169     value: '341'
7170     - description: Lebensmitteltechnologie
7171     value: '343'
7172     - description: Biotechnologie
7173     value: '344'

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7174 - description: Alte Musik Zusatzstdg.
7175   value: '345'
7176 - description: Interkulturelle Kommunikation und Bildung
7177   value: '346'
7178 - description: Chor- und Orchesterleitung
7179   value: '349'
7180 - description: Nachrichtentechnik
7181   value: '350'
7182 - description: Musiktheorie Zusatzstdg.
7183   value: '351'
7184 - description: European Studies in Technology and Business (ETB)
7185   value: '352'
7186 - description: Epidemiologie (WBSTG)
7187   value: '353'
7188 - description: Informationsverarbeitung
7189   value: '354'
7190 - description: Versicherungswesen Zusatzstdg.
7191   value: '355'
7192 - description: Sozialmanagement
7193   value: '356'
7194 - description: Mechatronik
7195   value: '357'
7196 - description: Wirtschaftsrecht
7197   value: '358'
7198 - description: "Sozialp\xE4dagogik und Sozialarbeit"
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7200 - description: Betriebswirtschaftliche Technik (Deutsch-NL)
7201   value: '365'
7202 - description: Verkehrsingenieurwesen
7203   value: '366'
7204 - description: Textiltechnik
7205   value: '367'
7206 - description: Jiddische Kultur, Sprache und Literatur
7207   value: '369'
7208 - description: Niederlande-Deutschland-Studien
7209   value: '370'
7210 - description: Bioinformatik und Genomforschung
7211   value: '371'
7212 - description: Ton und Bild
7213   value: '372'
7214 - description: Wirtschafts- und Arbeitsrecht Zusstdg
7215   value: '379'
7216 - description: Agrarwirtschaft
7217   value: '380'
7218 - description: Fahrzeug- und Verkehrstechnik
7219   value: '381'
7220 - description: Biomedizinische Technik (AOS)
7221   value: '382'
7222 - description: Chemieingenieurwesen (AOS)
7223   value: '384'
7224 - description: Elektrotechnik (AOS)
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7226 - description: Maschinenbau (AOS)
7227   value: '386'
7228 - description: Physical Engineering
7229   value: '387'
7230 - description: "Sehbehindertenp\xE4dagogik (Zstg)"
7231   value: '388'
7232 - description: "Sprachbehindertenp\xE4dagogik (Zstg)"
7233   value: '389'
7234 - description: "Schwerh\xF6rigenp\xE4dagogik (ZSTG)"
7235   value: '391'
7236 - description: "Geh\xF6rlosenp\xE4dagogik (ZSTG)"

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7241     value: '398'
7242     - description: Bibliothekswesen
7243     value: '399'
7244     - description: Informationswirtschaft
7245     value: '400'
7246     - description: Vermessung (berufsbegleitend)
7247     value: '401'
7248     - description: Informations- und Kommunikationsdesign
7249     value: '404'
7250     - description: Berufsbildungsingenieur Elektrotechnik
7251     value: '405'
7252     - description: Automobilwirtschaft
7253     value: '407'
7254     - description: Medieninformatik extern
7255     value: '408'
7256     - description: Technische Betriebswirtschaft (VBSTG) (WBSTG)
7257     value: '410'
7258     - description: Brennstoff-Ingenieurwesen
7259     value: '413'
7260     - description: Technische Chemie
7261     value: '415'
7262     - description: Angewandte Mathematik
7263     value: '417'
7264     - description: Pharmazeutische Chemie
7265     value: '418'
7266     - description: Optoelektronik
7267     value: '420'
7268     - description: Steuer- und Revisionswesen
7269     value: '422'
7270     - description: Pflege
7271     value: '424'
7272     - description: "Qualit\xe4t, Umwelt, Sicherheit und Hygiene"
7273     value: '426'
7274     - description: Umweltwissenschaften
7275     value: '427'
7276     - description: Stahlbau
7277     value: '429'
7278     - description: Umweltwissenschaften (WBSTG)
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7282     - description: Politikwissenschaft (F)
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7285     value: '433'
7286     - description: Molekulare Biotechnologie
7287     value: '435'
7288     - description: Wirtschafts- und Steuerrecht
7289     value: '438'
7290     - description: Wirtschaftsrecht (Berufsbegleitend)
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7293     value: '440'
7294     - description: Regionalwissenschaft Japan
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7305   value: '449'
7306 - description: Produkt-Design (FH) Objekt-Design
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7308 - description: Technische Medizinwirtschaft
7309   value: '451'
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7312 - description: Technische BWL (Verbundstdg.)
7313   value: '453'
7314 - description: Angewandte Informatik (Praxissemester)
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7316 - description: Finanz- und Anlagenmanagement
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7322 - description: Sozialarbeit
7323   value: '464'
7324 - description: Luft- und Raumfahrttechnik
7325   value: '465'
7326 - description: Landmaschinentechnik (Praxissem.)
7327   value: '466'
7328 - description: Entsorgungstechnik (kooperativ)
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7330 - description: Versorgungstechnik (KIA)
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7332 - description: Elektrotechnik (Praxissemester)
7333   value: '473'
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7335   value: '474'
7336 - description: Verfahrenstechnik
7337   value: '475'
7338 - description: Metallurgical Engineering
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7342 - description: "Gie\xDFereitechnik"
7343   value: '481'
7344 - description: "Gesundheits\xF6konomie"
7345   value: '483'
7346 - description: "H\xFCttentechnik"
7347   value: '484'
7348 - description: Tech. Informatik Praxissemester
7349   value: '485'
7350 - description: Wirtschaftsrecht (WBSTG)
7351   value: '486'
7352 - description: Politik
7353   value: '487'
7354 - description: Kernsicherheitstechnik
7355   value: '488'
7356 - description: Ton- und Bildtechnik (Elektrotechnik)
7357   value: '489'
7358 - description: Angewandte Sozialwissenschaft
7359   value: '490'
7360 - description: Wirtschaftschemie
7361   value: '491'
7362 - description: Bilinguales Lehren und Lernen (Zusatz)

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7363     value: '492'
7364     - description: Sozialarbeit (Praxissemester)
7365     value: '494'
7366     - description: "Sozialp\xE4dagogik (Praxissemester)"
7367     value: '495'
7368     - description: Werkstofftechnik
7369     value: '496'
7370     - description: Technikjournalismus
7371     value: '497'
7372     - description: Bilinguales Lernen (Zusatz)
7373     value: '498'
7374     - description: Textile and Clothing Management
7375     value: '499'
7376     - description: Chemie (Praxissemester)
7377     value: '503'
7378     - description: Technologie in den Tropen (Zusatz)
7379     value: '504'
7380     - description: Internationales Marketing (dt./franz.)
7381     value: '505'
7382     - description: Elektronik
7383     value: '506'
7384     - description: Betriebswirtschaft (Deutsch-Lateinamerika)
7385     value: '507'
7386     - description: Produktdesign
7387     value: '509'
7388     - description: Technische Betriebswirtschaft / Rohstoffe
7389     value: '510'
7390     - description: Techn. Betriebswirtsch. / Rohstoffe (berufsb.)
7391     value: '511'
7392     - description: Technische Betriebswirtschaft/Elektrotech.
7393     value: '512'
7394     - description: Techn. Betriebswirtsch. / Elektrotech. (berufsb.)
7395     value: '513'
7396     - description: Technische Betriebswirtschaft / Maschinenbau
7397     value: '514'
7398     - description: Techn. Betriebswirtsch. / Maschinenb. (berufsb.)
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7400     - description: Applied Biology
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7402     - description: Lernbereich Sachunterricht
7403     value: '517'
7404     - description: "Rehabilitation und P\xE4dagogik bei Behinderung"
7405     value: '518'
7406     - description: Oecotrophologie und Facility Management (Deutsch - NL)
7407     value: '519'
7408     - description: Mathematical Engineering
7409     value: '520'
7410     - description: "Mode, Luxusg\xFCter und Handelsmanagement"
7411     value: '521'
7412     - description: Spezielle Wirtschaftswissenschaft
7413     value: '524'
7414     - description: "Sozialp\xE4dagogik und Sozialarbeit (berufsbegleitend)"
7415     value: '526'
7416     - description: "Deutsches und Europ\xE4isches Wirtschaftsrecht"
7417     value: '528'
7418     - description: Sozialpolitik
7419     value: '529'
7420     - description: Freie Kunst
7421     value: '530'
7422     - description: Produktdesign (Praxissemester)
7423     value: '532'
7424     - description: Kommunikationsdesign (Praxissemester)
7425     value: '533'

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7426 - description: Produktionstechnik
7427   value: '534'
7428 - description: Innenarchitektur
7429   value: '536'
7430 - description: Landschaftsarchitektur
7431   value: '537'
7432 - description: "St\xE4dtebau und Raumplanung"
7433   value: '538'
7434 - description: Maschinentechnik
7435   value: '539'
7436 - description: Versorgungstechnik
7437   value: '541'
7438 - description: Vis. Kommunikation (ohne Schwerpunkt)
7439   value: '543'
7440 - description: "Katholische Religionsp\xE4dagogik"
7441   value: '545'
7442 - description: "Heilp\xE4dagogik"
7443   value: '546'
7444 - description: Versicherungswesen
7445   value: '547'
7446 - description: "Ur- und Fr\xFChgeschichte"
7447   value: '548'
7448 - description: Informationstechnik
7449   value: '550'
7450 - description: Qual. Manag. u. Sicherheitstechn.(Zusatzstdg.)
7451   value: '551'
7452 - description: Maschinenbauinformatik (Praxissemester)
7453   value: '552'
7454 - description: "Europ\xE4ischer Studiengang \xD6kotrphologie"
7455   value: '553'
7456 - description: Sozialmanagement (VBSTG) (WBSTG)
7457   value: '554'
7458 - description: Medizinische Informatik
7459   value: '555'
7460 - description: International Business (deutsch/spanisch)
7461   value: '556'
7462 - description: Aeronautical and Astronautical Technology
7463   value: '557'
7464 - description: Wirtschaftsingenieurwesen / Facility Management
7465   value: '558'
7466 - description: Wirtschaftsinformatik (kooperativ)
7467   value: '559'
7468 - description: International Management
7469   value: '560'
7470 - description: Information Technology Engineering
7471   value: '561'
7472 - description: Wirtschaftsinformatik (Konsekutiv)
7473   value: '562'
7474 - description: Energiesystemtechnik
7475   value: '564'
7476 - description: Kraftfahringenieurwesen
7477   value: '565'
7478 - description: Materialwissenschaften
7479   value: '566'
7480 - description: Rohstoffe und Geotechnik
7481   value: '567'
7482 - description: "Niederl\xE4ndische Studien"
7483   value: '568'
7484 - description: Textile Engineering extern
7485   value: '569'
7486 - description: Simulation Sciences
7487   value: '570'
7488 - description: Energieingenieurwesen

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7492     - description: Software Systems Engineering
7493     value: '573'
7494     - description: Produktionstechnologie
7495     value: '574'
7496     - description: Drug Regulatory Affairs (WBSTG)
7497     value: '579'
7498     - description: Wirtschaft (Fernstudium)
7499     value: '580'
7500     - description: Wirtschaftsrecht (VBSTG) (WBSTG)
7501     value: '581'
7502     - description: "Europ\xE4ische Betriebswirtschaft (Dt./Span.)"
7503     value: '582'
7504     - description: "Europ\xE4ische Betriebswirtschaft (Dt./Ital.)"
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7507     value: '584'
7508     - description: Hotelmanagement
7509     value: '585'
7510     - description: Development Management
7511     value: '586'
7512     - description: Angewandte Kognitions- und Medienwissenschaft
7513     value: '587'
7514     - description: Elektrotechnik und Informationstechnik
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7517     value: '589'
7518     - description: Maschinenbau (Verbundstudiengang)
7519     value: '590'
7520     - description: Bilingualer Unterricht - Englisch (Zusatzstdg)
7521     value: '591'
7522     - description: Betriebswirtschaftslehre / Marketing
7523     value: '592'
7524     - description: "Rechtswissenschaft f\xFCr im Ausland graduierte Juristen"
7525     value: '593'
7526     - description: Fennistik
7527     value: '594'
7528     - description: Klassische Literaturwissenschaften
7529     value: '595'
7530     - description: Mikro- und Medizintechnik
7531     value: '596'
7532     - description: Technomathematik (ausbildungsbegleitend)
7533     value: '597'
7534     - description: Total Facility Management
7535     value: '598'
7536     - description: Intern. Business Law and Business Management
7537     value: '599'
7538     - description: "\xD6kologie (Zusatzstudiengang)"
7539     value: '600'
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7541     value: '601'
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7543     value: '606'
7544     - description: Medizinassistentz
7545     value: '607'
7546     - description: Automatisierungstechnik / Robotik
7547     value: '608'
7548     - description: "P\xE4dagogik (Teilzeit)"
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7550     - description: Lernbereich Gesellschaftswissenschaften
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7552 - description: Lernbereich Mathematik
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7554 - description: Lernbereich Naturwissenschaften
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7557   value: '615'
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7559   value: '619'
7560 - description: Biotechnik
7561   value: '621'
7562 - description: Gestaltungstechnik
7563   value: '623'
7564 - description: Sprachlehrforschung
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7567   value: '625'
7568 - description: "Osteurop\xE4ische Geschichte"
7569   value: '627'
7570 - description: Analytische Chemie
7571   value: '628'
7572 - description: "Versorgungstechnik / Tech. Geb\xE4udeausr\xFCstung"
7573   value: '629'
7574 - description: Staatlicher Verwaltungsdienst
7575   value: '631'
7576 - description: Kommunaler Verwaltungsdienst
7577   value: '632'
7578 - description: Rentenversicherung
7579   value: '633'
7580 - description: Polizeivollzugsdienst
7581   value: '634'
7582 - description: Rechtspflege
7583   value: '635'
7584 - description: Strafvollzug
7585   value: '636'
7586 - description: Tierwissenschaften
7587   value: '638'
7588 - description: Nutzpflanzenwissenschaften
7589   value: '640'
7590 - description: Fahrzeugtechnik
7591   value: '645'
7592 - description: Schiffstechnik
7593   value: '646'
7594 - description: Steuerverwaltung
7595   value: '649'
7596 - description: Betriebswirtschaft (VBSTG)
7597   value: '650'
7598 - description: Baugeschichte
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7600 - description: Kunststofftechnik (VBSTG)
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7603   value: '658'
7604 - description: Schienenfahrzeugtechnik
7605   value: '660'
7606 - description: Chemie allg. (FH) Chemieingenieurwesen
7607   value: '661'
7608 - description: Historische Geographie
7609   value: '662'
7610 - description: Altorientalische Altertumskunde
7611   value: '664'
7612 - description: Altorientalische Philologie
7613   value: '665'
7614 - description: Sprach- und Kulturwissenschaft Zentralasiens

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7617     value: '670'
7618     - description: Kommunikations- und Informationstechnik (dual)
7619     value: '671'
7620     - description: Industrial Design
7621     value: '673'
7622     - description: Sozialwissenschaft (TZ)
7623     value: '675'
7624     - description: Materialwissenschaften (Teilzeit)
7625     value: '676'
7626     - description: Internationale Technische und Wirtschaftliche Zusammenarbeit
7627     value: '679'
7628     - description: Philologie des christlichen Orients
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7630     - description: Fertigungstechnik (Praxissemester)
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7632     - description: Alte Geschichte
7633     value: '687'
7634     - description: Mittlere Geschichte
7635     value: '688'
7636     - description: Neuere Geschichte
7637     value: '689'
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7643     value: '693'
7644     - description: "Ern\xE4hrungsmanagement"
7645     value: '695'
7646     - description: Wirtschafts- und Sozialwissenschaft
7647     value: '699'
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7649     value: '701'
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7660     - description: Chemieingenieurwesen (kooperativ)
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7662     - description: Allgemeiner Verwaltungsdienst
7663     value: '711'
7664     - description: Gesang Musiktheater
7665     value: '712'
7666     - description: Bibliotheksdienst
7667     value: '713'
7668     - description: Dienst im Verfassungsschutz
7669     value: '714'
7670     - description: "Ausw\xE4rtiger Dienst"
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7672     - description: Kriminologie und Polizeiwissenschaft
7673     value: '719'
7674     - description: Technische Informatik
7675     value: '720'
7676     - description: Wirtschaftsinformatik
7677     value: '721'

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7680 - description: Tanz
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7682 - description: Polizeivollzugsd. im Bundesgrenzschutz
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7684 - description: "Musikerziehung / P\xE4dagogik"
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7688 - description: Musiktherapie
7689   value: '729'
7690 - description: Korrosionsschutztechnik (Zusatzst.)
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7692 - description: Orientalische Kunstgeschichte
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7694 - description: "\xDCbersetzen Indonesisch"
7695   value: '738'
7696 - description: "\xDCbersetzen Arabisch"
7697   value: '739'
7698 - description: Wirtschaft
7699   value: '742'
7700 - description: Wirtschaftsingenieurwesen - Ing
7701   value: '743'
7702 - description: Wirtschaftswiss. f. Dipl. Ing. (Zusatzst.)
7703   value: '744'
7704 - description: Chemieingenieurwesen
7705   value: '746'
7706 - description: Textil- und Bekleidungstechnik
7707   value: '756'
7708 - description: "\xDCbersetzen Chinesisch"
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7710 - description: "\xDCbersetzen Japanisch"
7711   value: '758'
7712 - description: "\xDCbersetzen Koreanisch"
7713   value: '759'
7714 - description: "\xDCbers. (Spr. Naher, Mittl., Ferner Osten)"
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7717   value: '762'
7718 - description: Quantitat. Meth. der Wirtschaftswiss.
7719   value: '763'
7720 - description: Energy Science
7721   value: '765'
7722 - description: Biochemie / Biotechnologie
7723   value: '766'
7724 - description: "Gemeindep\xE4dagogik und Diakonie"
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7726 - description: Immobilienwirtschaft (Zusatz)
7727   value: '768'
7728 - description: Biomedizinische Technik
7729   value: '769'
7730 - description: Wirtschaftsmathematik
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7733   value: '773'
7734 - description: Ostasienwirtschaft (Zusatzstudiengang)
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7736 - description: Informationswissenschaft
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7748     - description: Spanien- und Lateinamerikastudien
7749     value: '787'
7750     - description: Lebensm.-technologie (Uni Bonn)
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7755     value: '791'
7756     - description: Restaurierung und Konservierung
7757     value: '792'
7758     - description: Arbeitswissenschaft (Zusatzstudiengang)
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7761     value: '796'
7762     - description: Baudenkmalpflege (Zusatzstudiengang)
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7775     value: '805'
7776     - description: Musiktherapie (Zusatzstudiengang)
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7793     value: '819'
7794     - description: Intern. Business (Dt./Brit.)
7795     value: '820'
7796     - description: "Literatur\xFCbersetzen"
7797     value: '821'
7798     - description: Holztechnik
7799     value: '823'
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7801     value: '826'
7802     - description: Architektur Aufbaustudium
7803     value: '828'

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7811   value: '833'
7812 - description: Verfahrenstechnik (kooperativ)
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7814 - description: Europastudien
7815   value: '839'
7816 - description: Gesundheitswiss. (Zusatzstudiengang)
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7818 - description: Sportpsychologie
7819   value: '841'
7820 - description: Entsorgungstechnik
7821   value: '842'
7822 - description: Technische Betriebswirtschaft
7823   value: '843'
7824 - description: Technischer Umweltschutz (Praxissemester)
7825   value: '844'
7826 - description: Technische Informatik (Elektrotechnik)
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7828 - description: Trainingssteuerung (Zusatzstudiengang)
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7830 - description: "Sport\xF6konomie"
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7832 - description: EuroStud Entsorgung
7833   value: '852'
7834 - description: Organisationspsychologie (Aufbaustud.)
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7836 - description: Medienwissenschaft (Phil)
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7842 - description: Planung und Beratung im Sozialw. (Erg.stud.)
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7844 - description: Logistik
7845   value: '867'
7846 - description: Medienplanung
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7848 - description: Nordamerikastudien
7849   value: '869'
7850 - description: Spatial Planning for Regions in Growing Economies (SPRING)
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7852 - description: Sportwissenschaft (Alterssport)
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7854 - description: Produktentwicklung und Produktion (dual)
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7856 - description: Audiovisuelle Medien (Zusatzst.)
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7858 - description: Audiovisuelle Medien (WBSTG)
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7860 - description: Naturwissenschaftliche Informatik
7861   value: '877'
7862 - description: Reg. Wiss. Ostasiens (Schwerpunkt China)
7863   value: '878'
7864 - description: "Lb. Kunst u. Musik \xE4sthet. Erziehung"
7865   value: '879'
7866 - description: Industrie Automation

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7872     - description: Steine und Erden / Tagebautechnik, Aufarbeitung und Veredelung
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7876     - description: Ostasienwiss. Japan / China (integr.)
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7878     - description: Mikroelektronik
7879     value: '890'
7880     - description: Statistik und Datenanalyse
7881     value: '891'
7882     - description: Vergl. Textilwiss. kulturgeschichtlich
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7884     - description: Sportwissenschaft (WBSTG)
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7895     value: '901'
7896     - description: Design
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7899     value: '907'
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7902     - description: "Rechtswissenschaft (deutsch / franz\xF6sisch)"
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7906     - description: Interdis. Reg. wiss. Lateinam. (Zu.stg.)
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7910     - description: Intern. Business (Dt./Franz.)
7911     value: '915'
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7913     value: '916'
7914     - description: Film-Fernsehen (Kamera)
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7917     value: '918'
7918     - description: Ingenieurinformatik (Informatik)
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7922     - description: Ingenieurinformatik - Maschinenbau
7923     value: '921'
7924     - description: Landwirts. Tropen / Subtropen (Aufbau)
7925     value: '922'
7926     - description: Praktische Informatik
7927     value: '923'
7928     - description: Soziale Verhaltenswissenschaft
7929     value: '924'

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7930 - description: Wirtschaftswiss. f. Ing. u. Natwiss. (Zus.)
7931   value: '925'
7932 - description: Betriebswirtschaft - Business in Europe
7933   value: '926'
7934 - description: Materialwissensch.
7935   value: '927'
7936 - description: Musikwissenschaft Aufbaust.
7937   value: '931'
7938 - description: Musikwissenschaft Zusatzst.
7939   value: '932'
7940 - description: "Musikp\xE4dagogik Aufbaust."
7941   value: '933'
7942 - description: "Musikp\xE4dagogik Zusatzst."
7943   value: '934'
7944 - description: "Business Studies / Deutsch-Franz\xF6sisch"
7945   value: '936'
7946 - description: "\xD6kologie"
7947   value: '938'
7948 - description: Euro-Stud.gang Management
7949   value: '940'
7950 - description: Kommunikationstechnik
7951   value: '942'
7952 - description: Elektrotechnik extern
7953   value: '943'
7954 - description: Angewandte Informatik (dual)
7955   value: '944'
7956 - description: Logistik-Management
7957   value: '947'
7958 - description: Geotechnik und Angewandte Geologie
7959   value: '948'
7960 - description: European Business Studies
7961   value: '951'
7962 - description: Mikrosystemtechnik
7963   value: '952'
7964 - description: European Mechanical Engineering Studies (EMES)
7965   value: '953'
7966 - description: Angewandte Kulturwissenschaft
7967   value: '954'
7968 - description: Finanzdienstleistungen
7969   value: '960'
7970 - description: Innovations- und Informationsmanagement
7971   value: '961'
7972 - description: "Bauingenieurwesen (Erg\xE4nzungsst.gang)"
7973   value: '962'
7974 - description: Maschinenbau extern
7975   value: '963'
7976 - description: Sprachen (Tourismus)
7977   value: '964'
7978 - description: Wirtschaftswissens. (Tourismus)
7979   value: '965'
7980 - description: Wirtschaft extern
7981   value: '968'
7982 - description: Mechatronik (Praxissemester)
7983   value: '969'
7984 - description: Maschinenbau (Praxissemester)
7985   value: '970'
7986 - description: Wirtschaftslehre / Politik
7987   value: '973'
7988 - description: Computerlinguistik
7989   value: '974'
7990 - description: Keltologie
7991   value: '975'
7992 - description: Pflegemanagement

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7993     value: '976'
7994     - description: Technische Betriebswirtschaft (Verbund)
7995     value: '977'
7996     - description: Psychotherapie (WBSTG)
7997     value: '978'
7998     - description: "Pflegep\xE4dagogik (Praxissemester)"
7999     value: '979'
8000     - description: Logistik und Handel
8001     value: '980'
8002     - description: Audiovisuelle Medien
8003     value: '981'
8004     - description: Neuroinformatik (Zusatzstudiengang)
8005     value: '982'
8006     - description: Abfallentsorgung
8007     value: '986'
8008     - description: Wirtschaftsgeographie
8009     value: '987'
8010     - description: Euro-Stg. Mechatronik
8011     value: '988'
8012     - description: "Maschinenbau (deutsch / franz\xF6sisch)"
8013     value: '989'
8014     - description: Wirtschaftspolitik
8015     value: '990'
8016     - description: Wirtschaftsingenieurwesen (ZSTG)
8017     value: '991'
8018     - description: Wirtschaftsingenieurwesen in Abendform (ZSTG)
8019     value: '992'
8020     - description: Elektrotechnik (berufsbegleitend)
8021     value: '993'
8022     - description: Maschinenbau (Teilzeit)
8023     value: '994'
8024     - description: "Humanit\xE4re Hilfe"
8025     value: '995'
8026     - description: Technische BWL (Teilzeit)
8027     value: '996'
8028     - description: Wirtschaft (berufsbegleitend)
8029     value: '997'
8030     - description: Technische BWL
8031     value: '998'
8032     - description: "Sonstige F\xE4cher"
8033     value: '999'
8034     format: ''
8035     pattern: ([0-9A-Z][0-9]{2})?
8036     title: str_fso_key
8037     type: string
8038     x-aisb-dbms-attr:
8039         check: ''
8040         collate: ''
8041         default: ''
8042         fk: ''
8043         generatedValue: ''
8044         notNull: true
8045         pk: false
8046         size: null
8047         specialType: string
8048         unique: false
8049     x-aisb-doc-attr:
8050         comments: ''
8051         constraints: ''
8052         entities: ''
8053         explanation: ''
8054         jointRespAggre:
8055             de: ''

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8056     en: ''
8057     label: Official key (IT.NRW) of the study program
8058     tags: ''
8059     unique_id: ''
8060     version:
8061       created:
8062         authors: RMS/BUW
8063         date: '2024-07-23'
8064         number: v3.5.0
8065       updated:
8066         authors: PP/BUW
8067         date: '2024-10-29'
8068         number: v.3.5.2
8069     virtual: false
8070     description: "Dimension 'study_program\u2019 of the AIStudyBuddy data model."
8071     title: study_program
8072     type: object
8073     x-aisb-doc-entity:
8074       comments: ''
8075       constraints: ''
8076       explanation: ''
8077       tags: ''
8078       version:
8079         date: '2024-07-23'
8080         number: v3.5.0
8081 - $id: v3.5.0-Draft
8082 $schema: schema.json
8083 abbrev: suco
8084 attributes:
8085 - deprecated: false
8086   description: ID that is used as an unique designation for a subject component
8087     at one location (university). The designation should correspond to the combinations
8088     of students and the study programs in which they participate.
8089   enum: null
8090   format: ''
8091   pattern: .*
8092   title: suco_id
8093   type: string
8094   x-aisb-dbms-attr:
8095     check: ''
8096     collate: ''
8097     default: ''
8098     fk: ''
8099     generatedValue: ''
8100     notNull: true
8101     pk: true
8102     size: null
8103     specialType: string
8104     unique: false
8105   x-aisb-doc-attr:
8106     comments: If only one subject is studied, the ID of the degree program is sufficient.
8107       If the study program comprises several sub-areas, then a new, extended key
8108       must be found to distinguish the sub-areas from one another.
8109     constraints: ''
8110     entities: ''
8111     explanation: ''
8112     jointRespAggre:
8113       de: ''
8114       en: ''
8115     label: Subject component ID
8116     tags: ''
8117     unique_id: v0203n022
8118     version:

```

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8119         created:
8120         authors: JEF/BUW
8121         date: '2023-02-07'
8122         number: v2.3.0
8123     updated:
8124     authors: PP/BUW
8125     date: '2024-10-29'
8126     number: v.3.5.2
8127     virtual: false
8128 - deprecated: false
8129 description: References to the degree program to which the subject component belongs
8130 enum: null
8131 format: ''
8132 pattern: ''
8133 title: suco_depr_id
8134 type: ''
8135 x-aisb-dbms-attr:
8136     check: ''
8137     collate: ''
8138     default: ''
8139     fk: degree_program.depr_id
8140     generatedValue: ''
8141     notNull: true
8142     pk: false
8143     size: null
8144     specialType: ''
8145     unique: false
8146 x-aisb-doc-attr:
8147     comments: ''
8148     constraints: ''
8149     entities: ''
8150     explanation: ''
8151     jointRespAggre:
8152         de: ''
8153         en: ''
8154     label: Degree program ID
8155     tags: ''
8156     unique_id: ''
8157     version:
8158         created:
8159         authors: JEF/BUW
8160         date: '2023-02-07'
8161         number: v2.3.0
8162         updated:
8163         authors: PP/BUW
8164         date: '2024-10-29'
8165         number: v.3.5.2
8166         virtual: false
8167 description: Dimension 'subject_component' of the AIStudyBuddy data model.
8168 title: subject_component
8169 type: object
8170 x-aisb-doc-entity:
8171     comments: ''
8172     constraints: ''
8173     explanation: ''
8174     tags: ''
8175     version:
8176         date: '2024-06-06'
8177         number: v3.5.0
8178 - $id: v3.5.0-Draft
8179 $schema: schema.json
8180 abbrev: suct
8181 attributes:

```



```

8182 - deprecated: false
8183 description: The subject component to which the information from subject component
8184 term refers.
8185 enum: null
8186 format: ''
8187 pattern: ''
8188 title: suct_suco_id
8189 type: ''
8190 x-aisb-dbms-attr:
8191   check: ''
8192   collate: ''
8193   default: ''
8194   fk: subject_component.suco_id
8195   generatedValue: ''
8196   notNull: true
8197   pk: true
8198   size: null
8199   specialType: ''
8200   unique: false
8201 x-aisb-doc-attr:
8202   comments: ''
8203   constraints: ''
8204   entities: ''
8205   explanation: ''
8206   jointRespAggre:
8207     de: ''
8208     en: ''
8209   label: Subject component ID
8210   tags: ''
8211   unique_id: v0203n023
8212   version:
8213     created:
8214       authors: JEF/BUW
8215       date: '2023-02-07'
8216       number: v2.3.0
8217     updated:
8218       authors: PP/BUW
8219       date: '2024-10-16'
8220       number: v3.5.1
8221   virtual: false
8222 - deprecated: false
8223 description: The term the information of this dimension are related to.
8224 enum: null
8225 format: yyyy(SS|WS)
8226 pattern: ([0-9]{4}(SS|WS))?
8227 title: suct_term
8228 type: string
8229 x-aisb-dbms-attr:
8230   check: ''
8231   collate: ''
8232   default: ''
8233   fk: ''
8234   generatedValue: ''
8235   notNull: true
8236   pk: true
8237   size: null
8238   specialType: string
8239   unique: false
8240 x-aisb-doc-attr:
8241   comments: ''
8242   constraints: ''
8243   entities: ''
8244   explanation: ''

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```

8245     jointRespAggre:
8246         de: ''
8247         en: ''
8248     label: Current Term
8249     tags: ''
8250     unique_id: op0012
8251     version:
8252         created:
8253             authors: JEF/BUW
8254             date: '2022-10-31'
8255             number: v2.0RC1
8256         updated:
8257             authors: RMS/BUW
8258             date: '2024-06-06'
8259             number: v3.5.0
8260     virtual: false
8261 - deprecated: false
8262     description: Reference to the examination regulation that apply in the respective
8263     semester
8264     enum: null
8265     format: ''
8266     pattern: ''
8267     title: suct_regu_id
8268     type: ''
8269     x-aisb-dbms-attr:
8270         check: ''
8271         collate: ''
8272         default: ''
8273         fk: regulation.regu_id
8274         generatedValue: ''
8275         notNull: true
8276         pk: false
8277         size: null
8278         specialType: ''
8279         unique: false
8280     x-aisb-doc-attr:
8281         comments: The version of the examination regulations stored for the current
8282             semester can be retrieved.
8283         constraints: ''
8284         entities: ''
8285         explanation: ''
8286         jointRespAggre:
8287             de: ''
8288             en: ''
8289         label: Regulation ID
8290         tags: ''
8291         unique_id: ''
8292         version:
8293             created:
8294                 authors: RMS/BUW
8295                 date: '2024-06-06'
8296                 number: v3.5.0
8297             updated:
8298                 authors: ''
8299                 date: null
8300                 number: ''
8301         virtual: false
8302 - deprecated: false
8303     description: total terms spent studying on subject component
8304     enum: null
8305     format: ''
8306     pattern: d*
8307     title: suct_term_total

```

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8308     type: integer
8309     x-aisb-dbms-attr:
8310         check: ''
8311         collate: ''
8312         default: ''
8313         fk: ''
8314         generatedValue: ''
8315         notNull: true
8316         pk: false
8317         size: null
8318         specialType: integer
8319         unique: false
8320     x-aisb-doc-attr:
8321         comments: ''
8322         constraints: ''
8323         entities: ''
8324         explanation: ''
8325         jointRespAggre:
8326             de: ''
8327             en: ''
8328         label: Subject semester
8329         tags: ''
8330         unique_id: ''
8331         version:
8332             created:
8333                 authors: RMS/BUW
8334                 date: '2024-06-06'
8335                 number: v3.5.0
8336             updated:
8337                 authors: ''
8338                 date: null
8339                 number: ''
8340         virtual: false
8341     - deprecated: false
8342     description: status of studying on subject_component. Possible values are listed
8343         in the enumeration table.
8344     enum:
8345     - description: Nicht exmatrikuliert
8346       value: '0'
8347     - description: Exmatrikulation aufgrund landesrechtl. Bestimmungen
8348       value: '1'
8349     - description: "Beendigung des Studiums nach bestandener Pr\xFCfung"
8350       value: '2'
8351     - description: Unterbrechung des Studiums
8352       value: '3'
8353     - description: "Beendigung des Studiums ohne Pr\xFCfung"
8354       value: '4'
8355     - description: Hochschulwechsel
8356       value: '5'
8357     - description: Ableistung eines Dienstes
8358       value: '6'
8359     - description: Aufgabe des Studiums
8360       value: '7'
8361     - description: "Streichung d.d.HS wg.f ehrender R\xFCckmeldg./Krankv."
8362       value: '8'
8363     - description: "Beendigung n. endg\xFCltig nicht bestand. Pr\xFCfung/VPr."
8364       value: '9'
8365     - description: "sonstige Gr\xFCnde"
8366       value: '10'
8367     - description: Fachwechsel
8368       value: '11'
8369     - description: Hochschulpartnerschaft/Erasmus
8370       value: '12'

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8371 - description: "R\xFCckzieher"
8372   value: '13'
8373 - description: Exmatrikulation
8374   value: '14'
8375 - description: "logisch gel\F6scht"
8376   value: '15'
8377 - description: geschlossen (Antrag oder ex lege)
8378   value: '16'
8379 - description: "geschlossen (Abschluss u./o. keine Fortsetzung m\F6glich)"
8380   value: '17'
8381 - description: "geschlossen (erschwert zu \xF6ffnen)"
8382   value: '18'
8383 - description: Verzicht auf Studienplatz
8384   value: '19'
8385 - description: "R\xFCcktritt von Immatrikulation"
8386   value: '20'
8387 - description: "nicht zur\F6ckgemeldet"
8388   value: '21'
8389 - description: Fehler
8390   value: '22'
8391 format: ''
8392 pattern: d*
8393 title: suct_status_key
8394 type: integer
8395 x-aisb-dbms-attr:
8396   check: ''
8397   collate: ''
8398   default: ''
8399   fk: ''
8400   generatedValue: ''
8401   notNull: true
8402   pk: false
8403   size: null
8404   specialType: integer
8405   unique: false
8406 x-aisb-doc-attr:
8407   comments: ''
8408   constraints: ''
8409   entities: ''
8410   explanation: ''
8411   jointRespAggre:
8412     de: ''
8413     en: ''
8414   label: term status of studying
8415   tags: ''
8416   unique_id: ''
8417   version:
8418     created:
8419       authors: RMS/BUW
8420       date: '2024-06-06'
8421       number: v3.5.0
8422     updated:
8423       authors: PP/BUW
8424       date: '2024-10-16'
8425       number: v3.5.1
8426   virtual: false
8427 - deprecated: false
8428 description: 'The reason why a student exmatriculated from the specific degree/subject
8429   combination. Important here are: - switching subjects of double major degree
8430   programs, - switching degree programs, - switching institutions, - exmatrication
8431   because of finishing a degree program, - exmatrication because failing an
8432   exam too often, - other reasons.'
8433 enum: null

```

```

8434     format: ''
8435     pattern: .*
8436     title: suct_status_comment
8437     type: string
8438     x-aisb-dbms-attr:
8439         check: ''
8440         collate: ''
8441         default: ''
8442         fk: ''
8443         generatedValue: ''
8444         notNull: false
8445         pk: false
8446         size: null
8447         specialType: string
8448         unique: false
8449     x-aisb-doc-attr:
8450         comments: The enumeration is just a union list of the items that are in use
8451                   at the universities BUW/RUB/RWTH right now. In the future, a redesign of the
8452                   categories should be done.
8453         constraints: ''
8454         entities: ''
8455         explanation: ''
8456         jointRespAggre:
8457             de: ''
8458             en: ''
8459         label: Reason of Exmatriculation
8460         tags: ''
8461         unique_id: ix0073
8462         version:
8463             created:
8464                 authors: JEF/BUW
8465                 date: '2022-10-31'
8466                 number: v2.3.1-RTM
8467             updated:
8468                 authors: RMS/BUW
8469                 date: '2024-06-06'
8470                 number: v3.5.0
8471         virtual: false
8472     - deprecated: false
8473     description: The individual standard period can deviate from the official standard
8474                 period through extra terms (sabbatical/Corona/etc.).
8475     enum: null
8476     format: ''
8477     pattern: d*
8478     title: suct_individual_period
8479     type: integer
8480     x-aisb-dbms-attr:
8481         check: ''
8482         collate: ''
8483         default: ''
8484         fk: ''
8485         generatedValue: ''
8486         notNull: false
8487         pk: false
8488         size: null
8489         specialType: integer
8490         unique: false
8491     x-aisb-doc-attr:
8492         comments: ''
8493         constraints: ''
8494         entities: ''
8495         explanation: ''
8496         jointRespAggre:

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```

8497     de: ''
8498     en: ''
8499     label: Individual standard period of study program
8500     tags: ''
8501     unique_id: sp0037
8502     version:
8503         created:
8504             authors: JEF/BUW
8505             date: '2022-08-25'
8506             number: v1.0.2
8507         updated:
8508             authors: PP/BUW
8509             date: '2024-10-29'
8510             number: v.3.5.2
8511     virtual: false
8512     description: Dimension 'subject_component_term' of the AIStudyBuddy data model.
8513     title: subject_component_term
8514     type: object
8515     x-aisb-doc-entity:
8516         comments: ''
8517         constraints: ''
8518         explanation: ''
8519         tags: ''
8520         version:
8521             date: '2024-06-06'
8522             number: v3.5.0
8523 - $id: v3.5.0-Draft
8524 $schema: schema.json
8525 abbrev: unit
8526 attributes:
8527 - deprecated: false
8528     description: ID that is used as an unique designation for an unit at one location
8529     (university)
8530     enum: null
8531     format: ''
8532     pattern: .*
8533     title: unit_id
8534     type: string
8535     x-aisb-dbms-attr:
8536         check: ''
8537         collate: ''
8538         default: ''
8539         fk: ''
8540         generatedValue: ''
8541         notNull: true
8542         pk: true
8543         size: null
8544         specialType: string
8545         unique: false
8546     x-aisb-doc-attr:
8547         comments: The unique designation used does not change over time.
8548         constraints: ''
8549         entities: ''
8550         explanation: ''
8551         jointRespAggre:
8552             de: ''
8553             en: ''
8554         label: Unit ID
8555         tags: ''
8556         unique_id: v0203n024
8557         version:
8558             created:
8559                 authors: JEF/BUW

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8560         date: '2023-02-07'
8561         number: v2.3.0
8562         updated:
8563         authors: RMS/BUW
8564         date: '2024-06-06'
8565         number: v3.5.0
8566         virtual: false
8567 - deprecated: false
8568 description: Reference to a subject component, in which a unit is credited
8569 enum: null
8570 format: ''
8571 pattern: ''
8572 title: unit_suco_id
8573 type: ''
8574 x-aisb-dbms-attr:
8575     check: ''
8576     collate: ''
8577     default: ''
8578     fk: subject_component.suco_id
8579     generatedValue: ''
8580     notNull: true
8581     pk: false
8582     size: null
8583     specialType: ''
8584     unique: false
8585 x-aisb-doc-attr:
8586     comments: ''
8587     constraints: ''
8588     entities: ''
8589     explanation: ''
8590     jointRespAggre:
8591         de: ''
8592         en: ''
8593     label: Subject component ID
8594     tags: ''
8595     unique_id: v0203n022
8596     version:
8597         created:
8598             authors: RMS/BUW
8599             date: '2024-06-06'
8600             number: v3.5.0
8601             updated:
8602             authors: PP/BUW
8603             date: '2024-10-16'
8604             number: v3.5.1
8605             virtual: false
8606 - deprecated: false
8607 description: Reference to a module, in which a unit is credited
8608 enum: null
8609 format: ''
8610 pattern: ''
8611 title: unit_modu_id
8612 type: ''
8613 x-aisb-dbms-attr:
8614     check: ''
8615     collate: ''
8616     default: ''
8617     fk: module.modu_id
8618     generatedValue: ''
8619     notNull: true
8620     pk: false
8621     size: null
8622     specialType: ''

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```

8623     unique: false
8624 x-aisb-doc-attr:
8625     comments: ''
8626     constraints: ''
8627     entities: ''
8628     explanation: ''
8629     jointRespAggre:
8630         de: ''
8631         en: ''
8632     label: Module ID
8633     tags: ''
8634     unique_id: v0203n024
8635     version:
8636         created:
8637             authors: RMS/BUW
8638             date: '2024-06-06'
8639             number: v3.5.0
8640         updated:
8641             authors: ''
8642             date: null
8643             number: ''
8644     virtual: false
8645 - deprecated: false
8646     description: Reference to examination regulations used for crediting the unit
8647     enum: null
8648     format: ''
8649     pattern: ''
8650     title: unit_regu_id
8651     type: ''
8652 x-aisb-dbms-attr:
8653     check: ''
8654     collate: ''
8655     default: ''
8656     fk: regulation.regu_id
8657     generatedValue: ''
8658     notNull: true
8659     pk: false
8660     size: null
8661     specialType: ''
8662     unique: false
8663 x-aisb-doc-attr:
8664     comments: Relationship is mandatory
8665     constraints: ''
8666     entities: ''
8667     explanation: ''
8668     jointRespAggre:
8669         de: ''
8670         en: ''
8671     label: Regulation ID
8672     tags: ''
8673     unique_id: v0203n033
8674     version:
8675         created:
8676             authors: RMS/BUW
8677             date: '2024-06-06'
8678             number: v3.5.0
8679         updated:
8680             authors: ''
8681             date: null
8682             number: ''
8683     virtual: false
8684 - deprecated: false
8685     description: Reference to the area in which the module was taken

```



```

8686     enum: null
8687     format: ''
8688     pattern: ''
8689     title: unit_area_id
8690     type: ''
8691     x-aisb-dbms-attr:
8692         check: ''
8693         collate: ''
8694         default: ''
8695         fk: area.area_id
8696         generatedValue: ''
8697         notNull: false
8698         pk: false
8699         size: null
8700         specialType: ''
8701         unique: false
8702     x-aisb-doc-attr:
8703         comments: ''
8704         constraints: ''
8705         entities: ''
8706         explanation: ''
8707         jointRespAggre:
8708             de: ''
8709             en: ''
8710         label: Area ID
8711         tags: ''
8712         unique_id: ''
8713         version:
8714             created:
8715                 authors: RMS/BUW
8716                 date: '2024-07-23'
8717                 number: v3.5.0
8718             updated:
8719                 authors: ''
8720                 date: null
8721                 number: ''
8722         virtual: false
8723 - deprecated: false
8724     description: Even though the final grade of a unit can be computed of its events,
8725         to control this attribute the final grade as recorded in the original database
8726         source is mentioned here. If no grade is present, the value '0' is recommended
8727     enum: null
8728     format: ''
8729     pattern: ([0-5](.[0-9])?)?
8730     title: unit_grade
8731     type: float
8732     x-aisb-dbms-attr:
8733         check: ''
8734         collate: ''
8735         default: ''
8736         fk: ''
8737         generatedValue: ''
8738         notNull: true
8739         pk: false
8740         size: null
8741         specialType: float
8742         unique: false
8743     x-aisb-doc-attr:
8744         comments: ''
8745         constraints: ''
8746         entities: ''
8747         explanation: ''
8748         jointRespAggre:

```

```

8749     de: ''
8750     en: ''
8751     label: Final grade
8752     tags: ''
8753     unique_id: sp0024
8754     version:
8755         created:
8756             authors: JEF/BUW
8757             date: '2022-07-25'
8758             number: v1.0.0
8759         updated:
8760             authors: RMS/BUW
8761             date: '2024-06-06'
8762             number: v3.5.0
8763     virtual: false
8764 - deprecated: false
8765     description: Number of credit points awarded for the achievement
8766     enum: null
8767     format: ''
8768     pattern: (d+(\.d+)?)?
8769     title: unit_credit_points
8770     type: float
8771     x-aisb-dbms-attr:
8772         check: ''
8773         collate: ''
8774         default: ''
8775         fk: ''
8776         generatedValue: ''
8777         notNull: true
8778         pk: false
8779         size: null
8780         specialType: float
8781         unique: false
8782     x-aisb-doc-attr:
8783         comments: ''
8784         constraints: ''
8785         entities: ''
8786         explanation: ''
8787         jointRespAggre:
8788             de: ''
8789             en: ''
8790         label: Credit points
8791         tags: ''
8792         unique_id: ''
8793         version:
8794             created:
8795                 authors: RMS/BUW
8796                 date: '2024-07-23'
8797                 number: v3.5.0
8798             updated:
8799                 authors: PP/BUW
8800                 date: '2024-10-16'
8801                 number: v3.5.1
8802         virtual: false
8803     description: Dimension 'unit' of the AISTudyBuddy data model. A unit can be everything
8804     depending on its instance level, like an area, a module, a component of a module,
8805     an exercise, a lectur or an exam.
8806     title: unit
8807     type: object
8808     x-aisb-doc-entity:
8809         comments: ''
8810         constraints: ''
8811         explanation: ''

```

```

8812     tags: ''
8813     version:
8814         date: '2024-06-06'
8815         number: v3.5.0
8816 - $id: v3.5.0-Draft
8817 $schema: schema.json
8818 abbrev: unev
8819 attributes:
8820 - deprecated: false
8821   description: ID that is used as an unique designation for an unit_event at one
8822     location (university)
8823   enum: null
8824   format: ''
8825   pattern: .*
8826   title: unev_id
8827   type: string
8828 x-aisb-dbms-attr:
8829   check: ''
8830   collate: ''
8831   default: ''
8832   fk: ''
8833   generatedValue: ''
8834   notNull: true
8835   pk: true
8836   size: null
8837   specialType: string
8838   unique: false
8839 x-aisb-doc-attr:
8840   comments: The unique designation used does not change over time.
8841   constraints: ''
8842   entities: ''
8843   explanation: ''
8844   jointRespAggre:
8845     de: ''
8846     en: ''
8847   label: Unit event ID
8848   tags: ''
8849   unique_id: v0203n026
8850   version:
8851     created:
8852       authors: JEF/BUW
8853       date: '2023-02-07'
8854       number: v2.3.0
8855     updated:
8856       authors: RMS/BUW
8857       date: '2024-06-06'
8858       number: v3.5.0
8859   virtual: false
8860 - deprecated: false
8861   description: Relationship between entities that shows which events a unit contains.
8862   enum: null
8863   format: ''
8864   pattern: ''
8865   title: unev_unit_id
8866   type: ''
8867 x-aisb-dbms-attr:
8868   check: ''
8869   collate: ''
8870   default: ''
8871   fk: unit.unit_id
8872   generatedValue: ''
8873   notNull: true
8874   pk: false

```

```

8875     size: null
8876     specialType: ''
8877     unique: false
8878     x-aisb-doc-attr:
8879         comments: ''
8880         constraints: ''
8881         entities: ''
8882         explanation: ''
8883         jointRespAggre:
8884             de: ''
8885             en: ''
8886         label: Unit ID
8887         tags: ''
8888         unique_id: v0203n024
8889         version:
8890             created:
8891                 authors: RMS/BUW
8892                 date: '2024-06-06'
8893                 number: v3.5.0
8894             updated:
8895                 authors: ''
8896                 date: null
8897                 number: ''
8898             virtual: false
8899     - deprecated: false
8900     description: Reference to a course offering. If this column is used then the other
8901         columns related to offerings (namely unev_exam_offering and unev_assessment_offering)
8902         should remain empty
8903     enum: null
8904     format: ''
8905     pattern: ''
8906     title: unev_cour_id
8907     type: ''
8908     x-aisb-dbms-attr:
8909         check: ''
8910         collate: ''
8911         default: ''
8912         fk: course_offering.cour_id
8913         generatedValue: ''
8914         notNull: false
8915         pk: false
8916         size: null
8917         specialType: ''
8918         unique: false
8919     x-aisb-doc-attr:
8920         comments: If this column is used then the offer columns related to offerings
8921             (namely unev_exam_offering and unev_assessment_offering) should remain empty
8922         constraints: ''
8923         entities: ''
8924         explanation: ''
8925         jointRespAggre:
8926             de: ''
8927             en: ''
8928         label: Course offering ID
8929         tags: ''
8930         unique_id: ''
8931         version:
8932             created:
8933                 authors: RMS/BUW
8934                 date: '2024-06-06'
8935                 number: v3.5.0
8936             updated:
8937                 authors: PP/BUW

```

```

8938         date: '2024-10-16'
8939         number: v3.5.1
8940         virtual: false
8941 - deprecated: false
8942     description: Reference to a exam offering. If this column is used then the other
8943         columns related to offerings (namely unev_course_offering and unev_assessment_offering)
8944         should remain empty
8945     enum: null
8946     format: ''
8947     pattern: ''
8948     title: unev_exam_id
8949     type: ''
8950     x-aisb-dbms-attr:
8951         check: ''
8952         collate: ''
8953         default: ''
8954         fk: exam_offering.exam_id
8955         generatedValue: ''
8956         notNull: false
8957         pk: false
8958         size: null
8959         specialType: ''
8960         unique: false
8961     x-aisb-doc-attr:
8962         comments: If this column is used then the offer columns related to offerings
8963             (namely unev_course_offering and unev_assessment_offering) should remain empty
8964         constraints: ''
8965         entities: ''
8966         explanation: ''
8967         jointRespAggre:
8968             de: ''
8969             en: ''
8970         label: Exam offering ID
8971         tags: ''
8972         unique_id: ''
8973         version:
8974             created:
8975                 authors: RMS/BUW
8976                 date: '2024-06-06'
8977                 number: v3.5.0
8978             updated:
8979                 authors: PP/BUW
8980                 date: '2024-10-16'
8981                 number: v3.5.1
8982         virtual: false
8983 - deprecated: false
8984     description: Reference to a assessment offering. If this column is used then the
8985         other columns related to offerings (namely unev_exam_offering and unev_course_offering)
8986         should remain empty
8987     enum: null
8988     format: ''
8989     pattern: ''
8990     title: unev_asse_id
8991     type: ''
8992     x-aisb-dbms-attr:
8993         check: ''
8994         collate: ''
8995         default: ''
8996         fk: assessment_offering.asse_id
8997         generatedValue: ''
8998         notNull: false
8999         pk: false
9000         size: null

```

```

9001     specialType: ''
9002     unique: false
9003     x-aisb-doc-attr:
9004     comments: If this column is used then the offer columns related to offerings
9005               (namely unev_exam_offering and unev_course_offering) should remain empty
9006     constraints: ''
9007     entities: ''
9008     explanation: ''
9009     jointRespAggre:
9010       de: ''
9011       en: ''
9012     label: Assessment Offering ID
9013     tags: ''
9014     unique_id: ''
9015     version:
9016       created:
9017         authors: RMS/BUW
9018         date: '2024-06-06'
9019         number: v3.5.0
9020       updated:
9021         authors: PP/BUW
9022         date: '2024-10-29'
9023         number: v.3.5.2
9024     virtual: false
9025   - deprecated: false
9026     description: See the description of 'term'.
9027     enum: null
9028     format: yyyy-mm-dd
9029     pattern: (d{4}-dd-dd)?
9030     title: unev_date
9031     type: date
9032     x-aisb-dbms-attr:
9033       check: ''
9034       collate: ''
9035       default: ''
9036       fk: ''
9037       generatedValue: ''
9038       notNull: true
9039       pk: false
9040       size: null
9041       specialType: date
9042       unique: false
9043     x-aisb-doc-attr:
9044     comments: ''
9045     constraints: ''
9046     entities: ''
9047     explanation: ''
9048     jointRespAggre:
9049       de: ''
9050       en: ''
9051     label: Date of the event
9052     tags: ''
9053     unique_id: sp0026
9054     version:
9055       created:
9056         authors: JEF/BUW
9057         date: '2022-07-25'
9058         number: v1.0.0
9059       updated:
9060         authors: RMS/BUW
9061         date: '2024-06-06'
9062         number: v3.5.0
9063     virtual: false

```

```

9064 - deprecated: false
9065 description: The state of the event respectively the unit. For exams, typical
9066 events would be 'Angemeldet', 'Teilgenommen', 'Bestanden'.
9067 enum: null
9068 format: ''
9069 pattern: .*
9070 title: unev_status
9071 type: string
9072 x-aisb-dbms-attr:
9073   check: ''
9074   collate: ''
9075   default: ''
9076   fk: ''
9077   generatedValue: ''
9078   notNull: true
9079   pk: false
9080   size: null
9081   specialType: string
9082   unique: false
9083 x-aisb-doc-attr:
9084   comments: 'An enumeration would be useful for the states. Two facts make this
9085     difficult: first, at the point where the domain of state was defined, not
9086     all states used at all three locations were known. Second, because unit can
9087     be everything, it is doubtful to find an exhaustive enumeration.'
9088   constraints: ''
9089   entities: ''
9090   explanation: ''
9091   jointRespAggre:
9092     de: ''
9093     en: ''
9094   label: State of the event
9095   tags: ''
9096   unique_id: sp0025
9097   version:
9098     created:
9099       authors: JEF/BUW
9100       date: '2023-01-09'
9101       number: v2.2.0
9102     updated:
9103       authors: RMS/BUW
9104       date: '2024-06-06'
9105       number: v3.5.0
9106   virtual: false
9107 - deprecated: false
9108 description: To reproduce the exam history of students, we need more attributes
9109 than we already have. For example, the same exam can be passed two times, but
9110 only the one with the more favorably result counts. Cancellation or deletion
9111 of events can be logged in the comment attribute.
9112 enum: null
9113 format: ''
9114 pattern: .*
9115 title: unev_status_comment
9116 type: string
9117 x-aisb-dbms-attr:
9118   check: ''
9119   collate: ''
9120   default: ''
9121   fk: ''
9122   generatedValue: ''
9123   notNull: false
9124   pk: false
9125   size: null
9126   specialType: string

```

```

9127     unique: false
9128 x-aisb-doc-attr:
9129     comments: In the future, this attribute should be standardized. Right now, there
9130       is to little data on how the attribute will be used for standardization.
9131     constraints: ''
9132     entities: ''
9133     explanation: ''
9134     jointRespAggre:
9135       de: ''
9136       en: ''
9137     label: Comment on the event
9138     tags: ''
9139     unique_id: op0022
9140     version:
9141       created:
9142         authors: JEF/BUW
9143         date: '2023-01-09'
9144         number: v2.2.0
9145       updated:
9146         authors: PP/BUW
9147         date: '2024-10-29'
9148         number: v.3.5.2
9149     virtual: false
9150 - deprecated: false
9151     description: All events compose a grade history of the corresponding unit. Please
9152       use '0' if the grade is unknown.
9153     enum: null
9154     format: ''
9155     pattern: ([0-5](.[0-9])?)?
9156     title: unev_grade
9157     type: float
9158 x-aisb-dbms-attr:
9159     check: ''
9160     collate: ''
9161     default: ''
9162     fk: ''
9163     generatedValue: ''
9164     notNull: true
9165     pk: false
9166     size: null
9167     specialType: float
9168     unique: false
9169 x-aisb-doc-attr:
9170     comments: ''
9171     constraints: ''
9172     entities: ''
9173     explanation: ''
9174     jointRespAggre:
9175       de: ''
9176       en: ''
9177     label: Grade of event
9178     tags: ''
9179     unique_id: op0017
9180     version:
9181       created:
9182         authors: JEF/BUW
9183         date: '2023-01-09'
9184         number: v2.2.0
9185       updated:
9186         authors: RMS/BUW
9187         date: '2024-06-06'
9188         number: v3.5.0
9189     virtual: false

```



```

9190 - deprecated: false
9191   description: To find the most recent event of a unit, all units are marked as
9192     inactive (false), while the most recent event is marked as active (true).
9193   enum: null
9194   format: ''
9195   pattern: ([01])?
9196   title: unev_is_active
9197   type: boolean
9198   x-aisb-dbms-attr:
9199     check: ''
9200     collate: ''
9201     default: ''
9202     fk: ''
9203     generatedValue: ''
9204     notNull: true
9205     pk: false
9206     size: null
9207     specialType: boolean
9208     unique: false
9209   x-aisb-doc-attr:
9210     comments: ''
9211     constraints: ''
9212     entities: ''
9213     explanation: ''
9214     jointRespAggre:
9215       de: ''
9216       en: ''
9217     label: Stage of event
9218     tags: ''
9219     unique_id: op0018
9220     version:
9221       created:
9222         authors: JEF/BUW
9223         date: '2023-01-09'
9224         number: v2.2.0
9225       updated:
9226         authors: RMS/BUW
9227         date: '2024-06-06'
9228         number: v3.5.0
9229     virtual: false
9230   description: Dimension 'unit_event' of the AIStudyBuddy data model.
9231   title: unit_event
9232   type: object
9233   x-aisb-doc-entity:
9234     comments: ''
9235     constraints: ''
9236     explanation: ''
9237     tags: ''
9238     version:
9239       date: '2024-06-06'
9240       number: v3.5.0
9241 - $id: v3.5.0-Draft
9242 $schema: schema.json
9243 abbrev: univ
9244 attributes:
9245 - deprecated: false
9246   description: ID that is used as a system-wide unique designation for an university.
9247     The designation is assigned by the data warehouse
9248   enum: null
9249   format: ''
9250   pattern: .*
9251   title: univ_id
9252   type: string

```

```

9253     x-aisb-dbms-attr:
9254         check: ''
9255         collate: ''
9256         default: ''
9257         fk: ''
9258         generatedValue: ''
9259         notNull: true
9260         pk: true
9261         size: null
9262         specialType: string
9263         unique: false
9264     x-aisb-doc-attr:
9265         comments: ''
9266         constraints: ''
9267         entities: ''
9268         explanation: ''
9269         jointRespAggre:
9270             de: ''
9271             en: ''
9272         label: University ID
9273         tags: ''
9274         unique_id: v0203n007
9275         version:
9276             created:
9277                 authors: JEF/BUW
9278                 date: '2023-02-07'
9279                 number: v2.3.0
9280             updated:
9281                 authors: RMS/BUW
9282                 date: '2024-06-06'
9283                 number: v3.5.0
9284         virtual: false
9285     - deprecated: false
9286     description: Name or title of the university.
9287     enum: null
9288     format: ''
9289     pattern: .*
9290     title: univ_name
9291     type: string
9292     x-aisb-dbms-attr:
9293         check: ''
9294         collate: ''
9295         default: ''
9296         fk: ''
9297         generatedValue: ''
9298         notNull: true
9299         pk: false
9300         size: null
9301         specialType: string
9302         unique: false
9303     x-aisb-doc-attr:
9304         comments: ''
9305         constraints: ''
9306         entities: ''
9307         explanation: ''
9308         jointRespAggre:
9309             de: ''
9310             en: ''
9311         label: University Long Name
9312         tags: ''
9313         unique_id: v0203n009
9314         version:
9315             created:

```

```

9316     authors: RMS/BUW
9317     date: '2024-02-22'
9318     number: v2.3.2-RTM
9319     updated:
9320     authors: RMS/BUW
9321     date: '2024-06-06'
9322     number: v3.5.0
9323     virtual: false
9324 - deprecated: false
9325     description: Self-selected and frequently used abbreviation of the university
9326     enum: null
9327     format: ''
9328     pattern: .*
9329     title: univ_abbreviation
9330     type: string
9331     x-aisb-dbms-attr:
9332     check: ''
9333     collate: ''
9334     default: ''
9335     fk: ''
9336     generatedValue: ''
9337     notNull: true
9338     pk: false
9339     size: null
9340     specialType: string
9341     unique: false
9342     x-aisb-doc-attr:
9343     comments: ''
9344     constraints: ''
9345     entities: ''
9346     explanation: ''
9347     jointRespAggre:
9348     de: ''
9349     en: ''
9350     label: University Abbreviation
9351     tags: ''
9352     unique_id: v0203n008
9353     version:
9354     created:
9355     authors: JEF/BUW
9356     date: '2023-02-07'
9357     number: v2.3.0
9358     updated:
9359     authors: PP/BUW
9360     date: '2024-10-29'
9361     number: v.3.5.2
9362     virtual: false
9363 - deprecated: false
9364     description: Survey key for the purposes of federal statistics. The key list is
9365     maintained by the German federal statistical office and the possible values
9366     are listed in the enumeration table.
9367     enum:
9368     - description: U Wuppertal
9369     value: '0140'
9370     - description: U Bochum (ohne Klinikum)
9371     value: '1081'
9372     - description: TH Aachen (ohne Klinikum)
9373     value: '1481'
9374     format: ''
9375     pattern: ([0-9]{3}[0-9A-Z])?
9376     title: univ_fso_key
9377     type: string
9378     x-aisb-dbms-attr:

```

```

9379     check: ''
9380     collate: ''
9381     default: ''
9382     fk: ''
9383     generatedValue: ''
9384     notNull: true
9385     pk: false
9386     size: null
9387     specialType: string
9388     unique: false
9389 x-aisb-doc-attr:
9390     comments: The list of possible values is limited to the key values of the participating
9391               universities
9392     constraints: ''
9393     entities: ''
9394     explanation: ''
9395     jointRespAggre:
9396       de: ''
9397       en: ''
9398     label: University statistics key
9399     tags: ''
9400     unique_id: ''
9401     version:
9402       created:
9403         authors: RMS/BUW
9404         date: '2024-07-23'
9405         number: V3.5.0
9406       updated:
9407         authors: PP/BUW
9408         date: '2024-10-29'
9409         number: v.3.5.2
9410     virtual: false
9411 description: Dimension 'university' of the AIStudyBuddy data model.
9412 title: university
9413 type: object
9414 x-aisb-doc-entity:
9415     comments: ''
9416     constraints: ''
9417     explanation: ''
9418     tags: ''
9419     version:
9420       date: '2024-06-06'
9421       number: v3.5.0

```

The yaml files could not describe every attribute of the DRM. Together with the new model, we decided to leave standard SQL and use NoSQL for some attributes instead. Although, you wouldn't use classical ER-diagram for NoSQL expressions, we kept this representation. The yaml files, derived from a specially customized JSON schema, could not express the attributes of NoSQL expressions without the need of redefining this schema. As a solution, we documented these particular expressions in a separate document.

## Complex Data Types of the Data Reference Model v3.5

### LocalizedString

A LocalizedString represents the translation of a field's content into different languages. The current version requests a German and English translation, represented by the fields `de` and `en`.

```
{
  "de": "(string) German translation",
  "en": "(string) English translation"
}
```

Example: The translation of the name of the study program Computer Science Bachelor would look like this:

```
{
  "de": "Informatik Bachelor",
  "en": "Computer Science Bachelor"
}
```

### LocalizedName

The LocalizedName provides a name translation not only in different languages (using LocalizedStrings) but also enables the provision of an optional `short_name`, e.g. if a module name has an established or official abbreviation.

```
{
  "complete_name": "(LocalizedString) The complete name in English and German",
  "short_name": "(LocalizedString) The optional short name in English and German"
}
```

Example: The translation of the name of the study program Computer Science Bachelor would look like this:

```
{
  "complete_name": {
    "de": "Informatik Bachelor",
    "en": "Computer Science Bachelor"
  },
  "short_name": {
    "de": "Info B.Sc.",
    "en": "CS B. Sc."
  }
}
```



## Event

The Event type represents events that can happen within the academic context. Its only required field is the date, containing the datetime of the event. All other fields, listed below, are optional.

```
{
  "date": "(datetime) The datetime of the Event",
  "duration": "(int) Optional: The duration of the Event in minutes",
  "room": "(string) Optional: The room the Event took place in",
  "instructor": "(string) Optional: The name of the instructor of the
    Event",
  "hybrid": "(bool) Optional: States if an Event took place both in
    person and online",
  "compulsory": "(bool) Optional: States if the Event was mandatory for
    students to attend",
  "recording": "(bool) Optional: States if the Event was recorded"
}
```

Example: The first event of a typical lecture in the winter semester 2024 would look something like this

```
{
  "date": "2024-10-14 12:00",
  "duration": "120",
  "room": "FL.00.01",
  "instructor": "Univ.-Prof. Dr.-Ing. Tobias Meisen",
  "hybrid": "false",
  "compulsory": "false",
  "recording": "true"
}
```

## Requirements

Requirements refer to a module, a module component, or an area and contain the various constraints to respect to start and finish it. Further, it lists various flags, like a study goal it is related to, can be given and a natural language description of constraints that cannot be modelled by the used constraint representation. E.g. a literature research course, required for a seminar, done by the university's library that hands out printed documents to certify successful participation.

```
{
  "start": "(string) The constraint to respect before being allowed to
    start with a module, a module component, or an area",
  "finish": "(string) The constraint to respect to complete a module, a
    module component, or an area successfully",
  "flags": "(list[string]) List of flags related to the requirement",
  "other": "(string) A natural language description of special
    requirements"
}
```

For a list of possible flags, please refer to the documentation of the solver's data model. (TODO: Before publication, either include the given list in the model definition or publish both at the same time and add a link here)

```
{
  "start": "{ 'Mathe' } & { ${CS} >= 120 }",
  "finish": "",
  "flags": [ "allow_auto_completion" ],
  "other": "Theoretical knowledge is required"
}
```

*In this example, before starting with the module that has these requirements, the module “Mathe” should have been done and at least 120 credit points in the area “CS” should have been collected. The Campus Management System cannot provide success results of this module; therefore, the student is allowed to mark as completed by himself, so that further planning takes it into consideration. Another relevant flag is “area\_by\_student”, where the student must choose the area of modules with multiple areas. If this flag is not used, the area will be chosen by the solver. Finally, the “other” field allows for adding requirements in natural language, if it does not fit in the model. These won’t be taken in consideration by the solver, but allows student to be at least aware of it.*



## Tags

The Tag data type represents a list of tags, categorized by types, languages and other. They enable referencing a group of modules. types tags refer to the type of a module (course, seminar, ...) and the languages tags to the languages a module is offered in. other tags can be used for additional tags, e.g. *math-related*.

```
{
  "types": "(list[string]) Tags defining the types of a module",
  "languages": "(list[string]) Tags listing the languages a module is
    offered in",
  "other": "(list[string]) Further tags not related to a module's type or
    language"
}
```

Example: **TODO:** *Hayyan*

```
{
  "types": ["Seminar"],
  "languages": ["English"],
  "other": ["Theoretical"]
}
```

In this example, the module is a theoretical seminar in English. For example, if theoretical knowledge is recommended for some other module, the tag "Theoretical" helps by recommending this seminar.

## StartPlan

While all previously presented data types provide a fixed set of fields, the StartPlan can have arbitrary keys.

A StartPlan object represents one or multiple possible study plan representing a certain study aim (as the key) with a tuple of a translation as a LocalizedString and the associated plan\_modules as the value.

```
{
  "(string) Key for the study aim": [
    "(LocalizedString) German and English representation of the study
    aim",
    "(list[int]) List of associated plan module IDs"
  ]
}
```

Example: The definition of a fulltime study program can be represented by:

```
{
  "fulltime": [
    { "de": "Vollzeit", "en": "Full time" },
    [ /* List of associated plan_module IDs */ ]
  ],
  "parttime": [ ... ]
}
```

```
}
```

### StartPlanMapping

The StartPlanMapping defines a mapping of term part keys on StartPlans. Term part keys refer to the instances a term can have. E.g. *summer* and *winter* for semesters and *autumn*, *winter* and *spring* for trimester.

```
{  
  "(string) Term part key": "(StartPlan) The related start plan"  
}
```

Example: The definition of different start plans for winter and summer semester as well as fulltime and parttime students can look like this:

```
{  
  "summer": {  
    "fulltime": [  
      { "de": "Vollzeit", "en": "Fulltime" },  
      [ /* List of associated plan_module IDs */ ]  
    ],  
    "parttime": [  
      { "de": "Teilzeit", "en": "Parttime" },  
      [ /* List of associated plan_module IDs */ ]  
    ]  
  },  
  "winter": { ... }  
}
```

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# Acronyms

## Technical Terms

**AISB** AIStudyBuddy. 3.2, 4.1, 4.2, *see also* Study Buddy & Buddy Analytics

**AP** work package (*Arbeitspaket*). 4.1–4.3, 5.2, 7.0–7.4, J

**ASP** Answer Set Programming. 4.1, 4.3, J

**CAMS** campus management system (*Campusmanagementsystem*). *see also* CMS

**CMS** campus management system. 3.2, 4.1, 4.2, 5.0, 5.3, 6.0, 7.0, 7.3, 7.4, J

**DBA** data base architecture. 3.2, 4.2

**DBM** data base model. 4.3, C

**DBMS** data base management system. 3.2, 4.3, C

**DRA** data base reference architecture. 4.2

**DRM** data base reference model. 3.1, 3.3, 4.1–4.3, 5.0–5.4, 6.0, 7.0, 7.3, 7.4, 8.0, I, J

**DSGVO** The GDPR is a regulation implemented by the European Union to protect the privacy and personal data of EU citizens. It imposes strict guidelines on data collection, storage, and processing, including requirements for consent and the right to data erasure. *see also* GDPR

**DW** A data warehouse is a central repository designed to store large amounts of historical data from different sources, optimized for analysis and reporting. It supports business intelligence activities such as querying and data mining. 4.3, 5.3, *see also* data repository

**GDPR** General Data Protection Regulation (*Datenschutzgrundverordnung*). 3.2, *see also* DSGVO

**IMS** information management system. 0.0, 3.1, 3.2, 4.1, 4.2, 5.0–5.3, J

**JPD** joint research project description. 0.0, 3.3, 4.1–4.3

**JRP** joint research project. 4.2, 5.0, 5.3, J

**LA** learning analytics. 5.3, 8.0

**LMS** learning management system (*Lernmanagementsystem*). 3.2, 4.1, 5.3

**LRS** learning record store. 4.2

**PDCA** plan-do-check-act cycle. 3.3

**PM** Process Mining. 4.1, 4.3, 5.2

**PS** examination system (*Prüfungssystem*). 4.1

**SMS** student management system. 3.2

**SQL** Structured Query Language. 3.0, 3.1, 4.3, 7.3

**xAPI** Experience API. 4.2

**University Terms**

**BUW** University of Wuppertal (*Bergische Universität Wuppertal*). [5.0](#), [5.1](#), [J](#)

**OSA** office of student affairs (*Studierendensekretariat*). [4.2](#)

**PO** examination regulations. [4.3](#), [5.1–5.4](#), [J](#), see also [degree program](#) & [module compendium](#)

**RUB** University of Bochum (*Ruhr-Universität Bochum*). [5.0](#), [J](#)

**RWTH** University of Aachen (*Rheinisch-Westfälische Technische Hochschule Aachen*). [5.0](#), [J](#)

**SLC** student life cycle. [3.1](#), [4.1–4.3](#), [5.1–5.3](#), [6.0](#), [7.1](#), see also [course of studies](#), [module](#), [course](#) & [credits or credit points](#)



# Glossary

## Technical Terms

**AIStudyBuddy** A joint research project to develop the applications [Study Buddy](#) and [Buddy Analytics](#). [3.2](#), [4.1](#), [4.2](#)

**analytic engine** An analytic engine is a computational system or software designed to perform complex data analysis. It uses algorithms and statistical methods to process large datasets and extract meaningful insights. [4.3](#), *see also* [DW](#)

**Buddy Analytics** An interactive, AI-based tool for supporting planning processes like the designing and development of competence-based curricula (keyword: [degree programs](#), or study course consulting (keyword: [courses of studies](#)). [4.1](#), [J](#), *see also* [Study Buddy](#)

**conceptual scheme** A global description of the data base(s) that hides the details of physical storage structures and concentrates on describing entities, data types, relationships, and constraints (Thalheim, [2000](#)). [4.2](#)

**data accordance** Data accordance refers to the process of aligning and matching corresponding variables or data points from different sources to ensure consistency and accuracy. This often involves standardizing data formats, resolving discrepancies, and harmonizing values to make the data comparable and ready for integration or analysis. [5.0](#)

**data asset** We understand data assets to be the data available under the administrative authority of a (sub)institution or organizational unit of a university, for example, the data of the Central Office of Examinations, or the data of the Student Service Office.. [0.0](#), [3.2](#)

**data base model** A database model defines the structure, organization, and relationships of data within a data base system. Common models include the relational, hierarchical, and network models, with the relational model being the most widely used. [4.3](#), [C](#)

**data custodian** A data custodian is an individual or organization responsible for the safe and secure management of data. They handle data storage, backup, and ensure compliance with policies for data access and integrity. [5.0](#)

**data dictionary** A data dictionary is a repository of metadata that describes the structure, relationships, and definitions of data elements in a database. It aids in data standardization and ensures consistency across data systems. [5.1](#)

**data footprint** A data footprint refers to the trail of data an individual leaves behind through their online activities and interactions. This includes personal information shared on websites, social media, transaction histories, browsing patterns, and any other data generated or collected from digital services, contributing to an individual's digital identity and privacy profile. A data footprint in the context of a student's life cycle refers to the collection of data points that represent a student's academic journey. This includes assessments, achievements, attendance, participation, and other academic or extracurricular data that track the student's progress and performance over time. The data footprint helps create a comprehensive view of the student's educational experience. [5.2](#)

**data repository** The digital or physical ordered acquisition, registration and/or collation of data in a form that allows third-party usage. [3.2](#)

**ER-diagram** An Entity-Relationship diagram is a graphical representation of the entities within a system and their relationships. It is commonly used in database design to illustrate data models, showing entities, attributes, and connections. [5.1](#), [5.2](#), [5.4](#), [6.0](#), [7.1–7.3](#), [I](#), [J](#)

**Experience API** A data and interface standard that lets software applications capture and share data on human performance, along with associated context information. [4.2](#)

**information management system** An information management system is a program that reads, stores, and processes data, analyses the data and dispense textual or visual analyses. [0.0](#), [3.1](#), [3.2](#), [4.1](#), [4.2](#), [5.0–5.3](#), [J](#)

**JSON** JSON is a lightweight, text-based format used to represent structured data. It is commonly employed for data interchange, data modeling, and as a storage medium in NoSQL databases. JSON's simple, human-readable structure makes it ideal for serializing and transmitting data between systems, as well as for storing data in key-value or document-based databases like MongoDB and CouchDB. [4.3](#)

**learning analytics** Learning analytics involves the collection, measurement, and analysis of data from educational contexts to improve learning outcomes. It helps educators understand learner behavior and optimize teaching methods. [5.3](#), [8.0](#)

**learning record store** A repository for learning records of learning activities supplied by connected learning systems. It is an essential component in process flows involving Experience API (xAPI). [4.2](#)

**Moodle** Moodle is an open-source learning management system (LMS) designed for creating and managing online learning environments. It supports a wide range of educational activities and tools for both students and instructors. [5.3](#), [8.0](#), *see also* [IMS](#) & [LMS](#)

**normal form** Normalization is a process in database design used to reduce data redundancy and improve data integrity. A database is in a certain "normal form" when it meets specific criteria, such as 1NF, 2NF, and 3NF. [4.3](#), *see also* [DRM](#)

**NoSQL** NoSQL databases are non-relational databases designed to handle large volumes of unstructured or semi-structured data. They offer flexibility and scalability, and are commonly used in big data and real-time web applications. [7.3](#), *see also* [SQL](#)

**plan-do-check-act cycle** The PDCA cycle is an iterative, four-step management method used for continuous improvement. It involves planning changes, implementing them, checking results, and acting on the findings to refine processes. [3.3](#)

**project partner** The participants according by the [List of participants](#) but grouped by the universities [University of Wuppertal \(BUW\)](#), [University of Bochum \(RUB\)](#), and [University of Aachen \(RWTH\)](#). [5.1](#)

**staging area** A staging area is a temporary storage space in a data warehouse where raw data is cleaned, transformed, and prepared before being loaded into the data warehouse for analysis. It acts as an intermediary buffer between source systems and the data warehouse. [4.3](#), *see also* [DW](#)

**Structured Query Language** SQL is a standardized programming language used to manage and manipulate relational databases. It allows users to query, insert, update, and delete data within a database using declarative statements. [3.0](#), [3.1](#), [4.3](#), [7.3](#)

**Study Buddy** An AI-based tool for well-informed and evidence-based study planning over the next terms (keyword: courses of studies) (Persike, 2021). 4.1, 5.2, J, *see also* [Buddy Analytics](#)

## University Terms

**course** A course in a university is a structured learning experience that typically involves lectures, assignments, exams, and other forms of assessment. It is designed to provide students with specific knowledge or skills in a particular subject area. 5.1, *see also* [credits or credit points](#), [module](#), [module compendium](#), [degree program](#), [course of studies](#) & [SLC](#)

**course catalogue** A course catalogue is a comprehensive listing of all the courses offered by a university. It typically includes course descriptions, prerequisites, credit values, and other relevant details to help students plan their academic programs. 5.2, *see also* [course](#), [module compendium](#) & [course of studies](#)

**course of studies** The course of studies inclusive all exams and visited courses of students or a certain student aiming at receiving a certain degree at a university. This is the embodiment of a degree program. 4.1, 4.3, 5.1, J, *see also* [degree program](#)

**credits or credit points** University credits are units of academic measurement that quantify the amount of work required for a course. They are typically awarded based on class hours and outside study time, with one credit corresponding to one hour of class time per week over a semester. To earn these credits, students must successfully complete assessments, such as exams or projects, associated with the course. *see also* [module](#), [module compendium](#), [degree program](#), [course of studies](#) & [SLC](#)

**degree program** The examination regulations including all possible modules and additional elements to receive a certain degree at a university. This is the *rule perspective* of a study course. 4.2, 5.1, J, *see also* [course of studies](#), [PO](#) & [module compendium](#)

**ECTS** ECTS is a standard used across the European Higher Education Area to measure and compare academic workloads. It allows for the transfer of academic credits between institutions and facilitates student mobility by ensuring that academic achievements are recognized across countries. 5.4, *see also* [credits or credit points](#)

**examination regulations** examination regulations (*Prüfungsordnung*). 4.3, 5.1–5.4, J

**module** Thematically and temporally self-enclosed, testable qualification units supplying credits and composed out of one or more courses, summing up a distinct field of knowledge or expertise. 5.1, 5.4, *see also* [module compendium](#)

**module compendium** A handbook (usually accredited by an agency), defining the content and exam modalities of the modules of a corresponding degree program. 5.1, 7.4, *see also* [degree program](#), [PO](#) & [module](#)

**student life cycle** The student life cycle encompasses the full progression of a student's academic journey, from initial enrollment to post-graduation activities. It includes stages such as admission, academic progression, assessments, achievements, and eventually, graduation. Each phase generates data that can be used to track, analyze, and optimize the student's educational experience. 3.1, 4.1–4.3, 5.1–5.3, 6.0, 7.1



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