

How to Write a Module Description

Version 5, as of October 2022

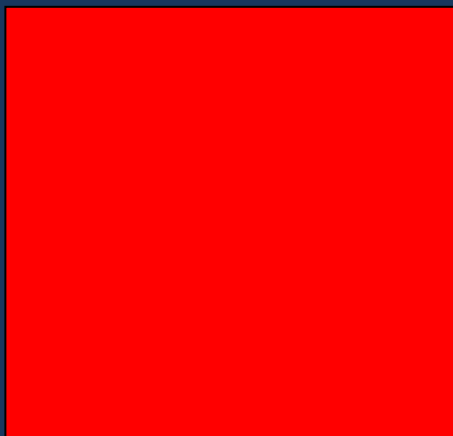


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I. Modules

Modules are learning units that form the “building blocks” of the new bachelor’s and master’s degree programs.

“Modules are thematically and chronologically related, self-contained units of study assigned with a certain number of credits and subject to assessment. They may combine various forms of instruction and learning (e.g. lectures, exercises, practica, e-learning, etc.)”.¹

An Overview of Key Criteria Specified in the Bologna Process

- Modules produce **learning outcomes**, i.e. measurable achievements formulated as statements specifying what students are able to DO, e.g. what skills, knowledge or behavior they are able to demonstrate, upon completion of the module. In total, the learning outcomes of all modules in a degree program should be developed in line with the overall learning objectives of the degree program. This being the case, modules can form components of different degree programs (e.g. export/import modules, such as Fundamentals of Mathematics).
- A module generally consists of **several courses**, which may combine **various forms of instruction and learning** (e. g. lectures, exercises, seminars, projects, self-study, homework, essays, e-learning units, etc.). Examination modules, consisting of self-study units and an exam, may also be appropriate for the development of students’ understanding of broader learning contexts.
- Modules convey thematically cohesive **content**. A module coordinator, appointed by the school or department, is responsible for the design of module content.
- As a rule, student performance is assessed in the form of a module **examination**. The type of examination (e.g. written exam, seminar paper, individual interview, presentation, etc.) should correspond to the desired **learning outcomes** of the module.
- Students who successfully complete a module are awarded **credits** (ECTS points). The number of credits awarded for a module reflects the student workload required for the module. Credits may also be awarded for modules requiring forms of qualification other than graded examination, such as participation in a study-related excursion.

“Module descriptions should indicate workload and the number of credit points to be awarded.”²

1KMK: „Ländergemeinsame Strukturvorgaben für die Akkreditierung von Bachelor- und Masterstudiengängen“, Fassung vom 04.02.2010, Appendix p. 1(our translation).

2KMK: „Ländergemeinsame Strukturvorgaben für die Akkreditierung von Bachelor- und Masterstudiengängen“, Fassung vom 04.02.2010, Appendix p 3 (our translation).

II. Module Descriptions and the Module Catalog

Current and prospective students, as well as teaching staff and other members of the university, require reliable information on the content of modules, their learning outcomes, and their qualitative and quantitative requirements. **Module descriptions**, written in accordance with university-wide guidelines and standards, are intended to provide this **transparency**.

“Module descriptions must contain, at least, the following information:

- a) Content and desired learning outcomes*
- b) Teaching and learning methods*
- c) (Recommended) prerequisites*
- d) Degree program allocation*
- e) Requirements for the awarding of credits*
- f) Credits and grades*
- g) Frequency with which the module is offered*
- h) Workload*
- i) Duration“³*

The Purpose of Module Description

Prospective students want to know before beginning their studies what qualifications they will have acquired upon graduation. Module descriptions provide students **orientation** throughout their studies by describing the qualifications to be attained in the respective module. As a rule, the more detailed the description of what students will be able to DO upon completion of the module, the greater their **motivation** to learn.

Module descriptions are a useful tool in the **credit recognition process**, when students transfer from one university to another, change their majors, or spend time abroad.

Module descriptions facilitate **communication** between teaching staff within schools and departments and promote the systematic reflection of teaching and learning processes.

The Module Catalog as a Component of Quality Management

The **total of all module descriptions** belonging to a particular degree program is the program's module catalog. The module catalog can be used to ensure that course offerings comply with the overall objectives of the degree program and do not contain any unwanted overlapping of content or structural gaps in acquired qualifications. Module catalogs also serve as documentation of **internal and external requirements** within the scope of TUM's QM system.

The module catalog is generated by TUMonline (also as a PDF) and is to be made accessible to everyone. Module catalogs may also be made available in other forms, as necessary, to improve accessibility.

³KMK: „Ländergemeinsame Strukturvorgaben für die Akkreditierung von Bachelor- und Masterstudiengängen“, Fassung vom 04.02.2010, Appendix p. 1 (our translation).

III. Module Descriptions at TUM

Modules are components of degree programs and are to be described with regard to learning outcomes. The overall learning objectives of the degree program thus serve as the point of orientation for determining and formulating intended learning outcomes and, in turn, for writing module descriptions.

The cornerstones of module description – **learning outcomes, teaching and learning methods, content, assessment** – together with other general information, such as frequency, duration, etc, should be closely and **logically related**. Only then, can it be certain that the choice of examination method is adequate for the assessment of specified learning outcomes (key-word: competence-oriented assessment, cf. p.14).

Four guiding questions for module description:

- **What learning outcomes is the student to have achieved upon completion of the module?**
- **What teaching and learning methods will be employed to achieve these outcomes?**
- **What content is the module to communicate?**
- **How is students' achievement of these outcomes to be assessed?**



1. Learning Outcomes

Learning outcomes measurable achievements formulated as statements specifying what students are **able to DO**, e.g. what **skills, knowledge or behavior** they are able to demonstrate, upon completion of the module.

Learning outcomes shift the focus from instructional content to student achievement, i.e. acquired competencies.

Learning outcomes describe the results of a learning process.⁴

Learning outcomes always refer to the module as a whole, not just to individual teaching sessions.

⁴Cf. DAAD (Ed.). Lernergebnisse (Learning Outcomes) in der Praxis. Ein Leitfaden. 2008. 28

The Bologna Process is characterized by the shift to a results-oriented model of education.⁵ This shift changes our perspective from the question “What *content* will be taught?” to “What are the intended *outcomes* of instruction?”

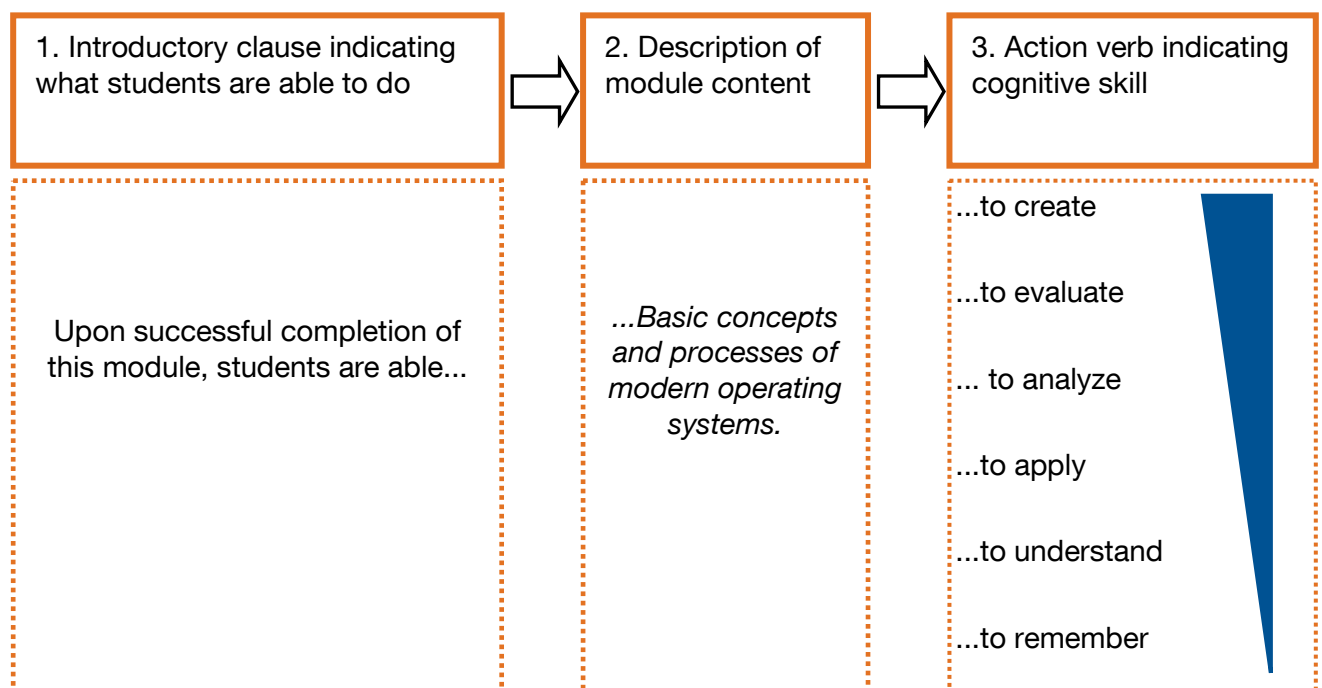
Formulating learning outcomes statements

When considering how to formulate learning outcomes, it is best to think about which knowledge and skills are to be the **result** of students’ successful completion of the module.

Learning outcomes should not be confused with learning objectives: Objectives take the perspective of teachers, i.e. the intended outcomes of instruction. Learning outcomes are achieved results of what students learned. Put simply, the one is a hope; the other a promise.

Learning outcomes statements should specifically state **the skills students will have achieved** upon completion of the module. They should also state which level of cognitive thinking is necessary to achieve the intended outcomes. Here, it is important to select the appropriate verb corresponding to the cognitive process involved. Before turning to a more detailed discussion of verb choice, first consider the following schematic as an aid to formulating learning outcomes statements:

Fig. 1: Schematic—Formulating Learning Outcomes



⁵The learning outcomes approach is based on the work of the “behavioural objectives” movement in the USA in 1960s and 1970s. Its major proponents include, Robert Mager, David Gosling, and Jenny Moon. Source: DAAD (Ed.) Lernergebnisse (Learning Outcomes) in der Praxis. Ein Leitfaden. 2008. p. 23f

In addition, these general rules may assist you in formulating learning outcomes statements:

- Ideally, learning outcomes are described in a single sentence. (Write only multiple sentences if it serves the purpose of clarity.)
- Choose simple and unambiguous terms to describe learning outcomes, so that they are understandable for all users, both within and outside the university community.
- Learning outcomes statements should be neither too broad nor too narrow (cf. examples on page 9).
- Limit the number of learning outcomes to the most significant (max. 8) rather than numerous less significant ones.

Choosing the Right Verbs

Selecting the appropriate action verbs corresponding to the learner's cognitive process is key in differentiating among various types of learning outcome. Learning outcomes should be unambiguous, simple and clear, as well as verifiable and measurable. As such, selecting the appropriate verb to describe them is not a trivial matter.

Bloom's Taxonomy⁶

The educationalist Benjamin Bloom compiled a list of concrete verbs in the form of a **taxonomy**⁷, wherein each verb corresponds to a particular **cognitive level**. If, after successful completion of a fundamentals module, for example, students are to be able to understand XY content and recapitulate it within a given context, students in a higher level module will be able to evaluate XY content, thus performing a cognitive transfer of their knowledge.

Anderson and Krathwohl⁸ revised Bloom's taxonomy to serve as a tool in formulating learning outcomes statements and facilitate the writing of module descriptions:

Fig. 2: Anderson and Krathwohl's Taxonomy

Deutsch	English
1. erinnern	1. remembering
2. verstehen	2. understanding
3. anwenden	3. applying
4. analysieren	4. analyzing
5. bewerten	5. evaluating
6. entwickeln	6. creating

⁶ Benjamin Samuel Bloom (1913-1999), PhD in Education, taught and researched at the University of Chicago, USA.

⁷ Bloom, B.S., Engelhardt, M., Furst, E.J., Hill, W., Krathwohl, D.: Taxonomy of educational objectives. Volume I: The cognitive domain. New York 1956.

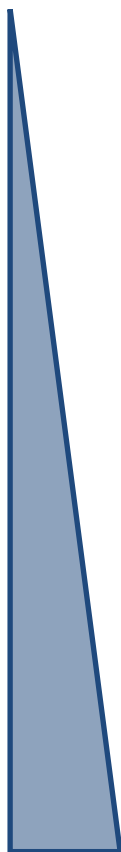
⁸ Anderson, L.W. u. Krathwohl, D.R. (Eds.): A Taxonomy of Learning, Teaching and Assessing. A Revision of Bloom's Taxonomy of Educational Objectives. Addison Wesley Longman. 2001.

NB: It is generally understood that **each higher stage of cognition subsumes those below it**, e.g. “apply” (stage 3) includes “understand” (stage 2) and “remember” (stage 1). Because these verbs correspond to particular cognitive levels, they are also known as **keywords**.

Fig. 3 provides a table of synonyms for the keywords of the above taxonomy that will help you make fine distinctions between learning outcomes within individual cognitive levels. (They also provide you with options for varying the wording of your descriptions, though the focus should remain on clarity and not stylistic flair.)

Fig. 3: Keywords and Synonyms

remembering	recognize, remember, identify, recall, define, state, name, reproduce, list, repeat, explain...
understanding	compare, explain, present, translate, illustrate, classify, argue, adapt, describe, extrapolate, illuminate, discuss...
applying	carry out, demonstrate, execute, measure, solve, conduct, predict, modify, operate, use, implement...
analyzing	comparing, organizing, deconstructing, attributing, outlining, structuring, integrating...
evaluating	checking, hypothesizing, critiquing, experimenting, judging, testing, detecting, monitoring, differentiating...
creating	designing, constructing, planning, producing, inventing, devising, making, generating...



NB: For the sake of clarity, the synonyms listed here appear only once in connection with a specific cognitive domain. They are not, however, exclusive to that domain. In some cases, verbs may be used to describe outcomes in more than one cognitive domain; their propriety, then, should be clear from the context.

Cognitive Levels and the Progression of Studies

As a rule, the levels of cognition associated with learning outcomes of sequential modules as a student moves through his or her degree program should become respectively higher, e.g. the learning outcomes of introductory/fundamentals modules equate to “remembering” and “understanding,” while those of modules completed later in the program curriculum equate to “analyzing,” “evaluating” – this progression takes place throughout the student’s studies through to the master’s degree, where students achieve outcomes, such as “creating,” corresponding to advanced stages of cognition.

More Tips for Formulating Learning Outcomes

- Use only one verb per outcome.
- List the outcomes in order of their cognitive level (ascending or descending).

Sample Formulations of Learning Outcomes

NB: The following examples have been taken out of their original context and are provided solely for the purpose of illustration – their wholesale appropriation for other module descriptions will not create the desired results.

Example 1

Students acquire detailed and differentiated knowledge of classroom models together with their specifications for mathematics and science didactics, in particular, regarding the central influences on learning in the classroom and student/teacher interaction.

Furthermore, they gain knowledge of relevant research designs of classroom research and their theoretical foundation. On the basis of this knowledge, students are able to develop and produce a classroom model in independent project work, to identify a research question and to deduce an appropriate research design, including a work schedule for the investigation of a specific research question.

Example 2

Upon completion of the module, students are able to understand and analyze:

- approaches to leadership and management.
- intercultural aspects of Asian and European management, so that they are able to make basic comparisons and draw conclusions about the differences between and relationship of Europe and Asia in modern history
- the fundamentals of business administration in Asia and Europe, i.e. they have thorough knowledge of the key criteria for running a successful company in a competitive environment
- the process and importance filing patents, as well as the components of a patent. Students are also able to search and use existing patents to assist their study, research and work.

Finally, students are able to understand globalization as a future trend, understand and analyze the problems arising in the process of globalization due to cultural, social and economic factors and apply this knowledge situationally.

2. Teaching and Learning Methods

This section describes the teaching and learning methods to be employed to achieve the intended outcomes. The key question is: Which teaching and learning methods are best suited to achieve the module's intended learning outcomes?

Ideally, different methods of teaching will be employed for a type of course (i.e. lecture, seminar, tutorial, laboratory or practical course). For a seminar, for example, you may decide that “active learning” techniques, such as “Just-in-Time Teaching (JiTT),” are best suited to achieving your outcomes. While lecturing mainly serves to transfer knowledge directly, exercise modules let students participate actively by employing various learning methods, i.e. presentations, teamwork, experiments, etc.

Example: If, after successful completion of the module, students are to be able to conduct experiments independently, lecturing alone is *not* an adequate teaching method. Instead, a combination of methods, such as seminars, exercises, practica, tutorials, etc. would be better suited to achieving the intended outcomes by providing students guided, hands-on experience (i.e. experiments) through which to acquire laboratory skills.

While oral presentation is ideal for lecturing, it is not necessarily fitting for a tutorial. Instead, teamwork followed by a discussion of the results might be more suitable.

Check:

You should select the teaching and learning methods best suited to achieving the module's intended learning outcomes.

If you have difficulty deciding which methods are best suited for your situation (e.g. because the number of students in your module prohibits formats designed for a smaller group size), a member of the team at the TUM Center for Study and Teaching – Quality Management or at ProLehre | Media and Didactics can offer assistance.

The module description should explain your choice of teaching methods from a student-centered perspective.

3. Content

The **discipline-specific content** (including discipline-specific methods) of the module should be described as clearly and in as much detail as possible. Experience has shown that listing 10 – 12 items generally provides a sufficient amount of detail for the module description. These may take the form of a bullet list.

As a rule, the volume of module content should be gauged by what a student can realistically achieve in the time allotted for the module (duration in semesters).

Please note: The relationship between content and learning outcomes can be problematic. The tendency is to become “teacher” rather than “**student**” **centered**, i.e. that you begin to think in terms of “teaching objectives” rather than “**learning outcomes**”. To help avoid this pitfall, we recommend that you draft your module description in the order presented on page 5 – beginning with learning outcomes, followed by teaching and learning methods, content,

and ending with assessment. Formulating learning outcomes in advance of describing module content will help you maintain the proper student-centered focus of learning outcomes and avoid repeating content descriptions as pseudo-outcomes.

4. Assessment – Coursework and Examination Requirements

Examinations are graded. **Coursework** is assessed as “pass” or “fail.” (cf. APSO (English version) § 6 Para. 7).

In addition to information on the type and duration of examination and opportunities for repeat examination, the **description of coursework and examination requirements** for the purpose of assessment forms a central element of the module description, as a whole. Learning outcomes and the assessment of students’ achievement thereof represent the bookends of the module as a self-contained unit of study. **It is learning outcomes that are to be assessed.**

“Examinations serve to assess the degree to which students have achieved the qualification objectives specified for the module. They are related to the competencies to be acquired upon successful completion of the module.”⁹

The General Academic and Examination Regulations for bachelor’s and master’s programs of the Technical University of Munich (APSO), together with the program-specific regulations (FPSO), serve as the legal framework of student assessment.

The following questions may serve as a guide to completing the assessment section of the module description:

- **How will I assess students’ achievement of learning outcomes?**
- **Why have I chosen this method of assessment?**
- Will I allow students to use learning aids (notes, reference material, etc.) during the examination?
- What other information might students require about the scope of coursework and examination requirements?
- How will I calculate final grades (weighting)?
- What time span will I set for the exam?

⁹Accreditation Council: Regeln des Akkreditierungsrates für die Akkreditierung von Studiengängen und für die Systemakkreditierung, 08.12.2009, i.d.F. 20.02.2013, p. 12.

Sample Formulations of Coursework and Examination Requirements:

Example 1

Students must submit 6 lab reports. The students demonstrate with the reports that they have gained deeper knowledge of the specific lab equipment and its components, of measurement methods incl. chemical measurements and can use analytical tools, methods and programs to optimize processes, simulate activities in order to solve different problems in power plants. They show that they are able to solve extensive measurement tasks, know norms to be considered and how to evaluate results, to interpret different components, to analyze data with the aid of the equipment. Students know how to document this knowledge in reports by using literature and with more time at their disposal.

In the written examination students demonstrate by answering questions under time pressure and without helping material the theoretical knowledge of components, processes and power plants as well as of the parameters and that can evaluate the effects of parameter changes on different processes.

The final grade is an averaged grade from the written examination (40 %) and from the lab reports (10 % each / overall 60 %).

Example 2

The examination consists of a presentation of contents and results of a project in a 10 minute oral report, including subsequent discussion (30%), preparation of a written report containing the content and results of the project (40%), regular discussions with the assigned tutor (research assistant) about the progression of the project and next steps (30%). The presentation is a means to measure the student's ability to understand a technical/scientific subject, to analyze and evaluate facts and factors of influence, to summarize the subject and present it to an audience, and to conduct a discussion about the presented subject. Written summaries measure the student's ability to summarize the major facts and the conclusion of a presentation in a clear and concise manner, both in a short abstract (150 words) and in a one-page executive summary.

Regular discussions with the tutor measure the student's ability to develop an idea from initial concepts to the complete picture within a given timeframe, delivering interim results at relevant milestones.

Competence-Oriented Assessment

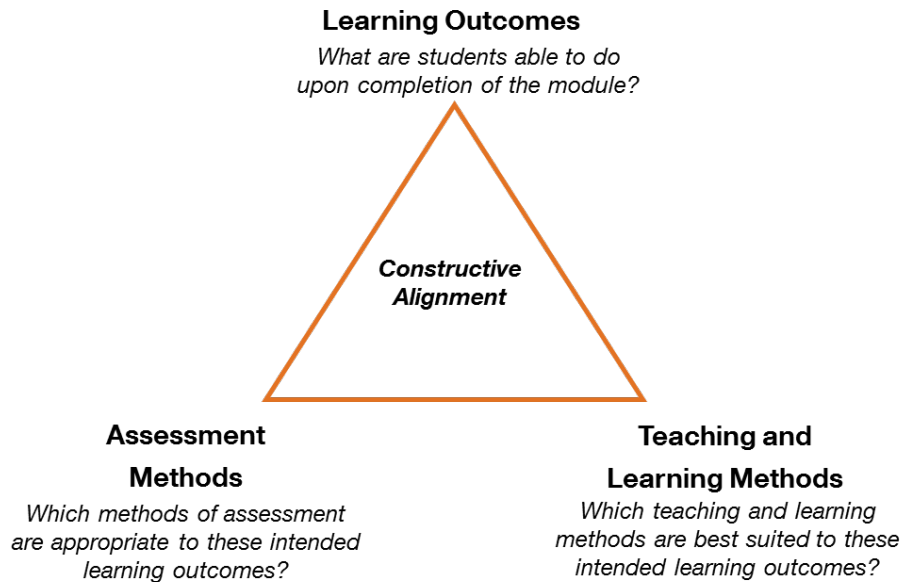
A key focus of the Bologna Process is the shift in orientation of education to outcomes. Assessment in the form of coursework and examinations plays an important role, here, but not as a means of testing students' ability to merely internalize module content.

Competence-oriented assessment measures the student's attainment of clearly-defined disciplinary and extradisciplinary learning outcomes at the level appropriate to the module and degree program. This is only possible when both the content and method of assessment are "aligned" with the learning outcomes of the module.

Constructive Alignment

The “alignment” of teaching, learning and assessment is referred to in English-language education theory as **constructive alignment**:

Fig. 6: Constructive Alignment



Assessment Methods

For assessment you may choose between written and oral examinations (cf. sample FPSO (English version) § 41).

Forms of written examination include:

- Essay exam
- Multiple choice (also in combination with essay exam)
- Seminar paper
- Term paper
- Portfolio
- Project report
- Parcours exam
- ...

Forms of oral examination:

- One-on-one interview
- Oral report
- Presentation
- Group examination
- ...

Using Examinations to Guide the Teaching Process

As with teaching and learning methods, there are advantages and disadvantages to each of the various types of examination. While oral examinations, for example, allow you to form a more complete picture of individual students and to respond to the dynamics of the individual exam situation, written examinations allow for the assessment of large numbers of students at the same time, in a short amount of time, under the same conditions. Because student learning behavior is shaped largely by the examination, your choice of both the form and content of the examination warrants careful consideration.

Tip: Think of possible learning activities that will help prepare students for the type of examination you have chosen. If, for example, the intended learning outcomes of your module correspond to an advanced cognitive level, select activities that will foster those advanced skills and abilities as they move through the module, leading up to the exam.

Explain your choice of examination method under the “Coursework and Examination Requirements” rubric of the module description.

5. Plausibility Check

You have now completed a draft of all four cornerstones of the module description, as outlined on page 5 of this guide. Take time before entering your description into TUMonline to review the plausibility and coherence of your module and its components by answering the following questions. If you can respond with a confident “yes” to each of them, you have fulfilled the criteria for module description at TUM:

- Have you formulated the intended learning outcomes of the module using key words from the taxonomy of cognitive levels?
- Have you selected the teaching and learning methods best suited to achieving these outcomes and provided reasons for the propriety of your choices?
- Have you carefully considered the different characteristics of various methods of assessment, selected those most appropriate for measuring the intended learning outcomes of your module, and ensured that your chosen method of assessment complies with the stipulations of the General (and program-specific) Academic and Examination Regulations? Have you provided reasons for the propriety of your choices?

Now you can test the plausibility of your module description by modifying your starting point. This time, begin with your description of module content and proceed to teaching and learning methods, learning outcomes, and, finally, assessment:



If all four steps are coherently related, i.e. derive logically from one another, you have completed the core of your module description.

You need only supplement the general module information and enter your description in TUMonline. Your descriptions of the four central elements of the module can be entered into the designated text boxes.

IV. Module Description in TUMonline

The input mask for module descriptions in TUMonline is divided into 8 thematic blocks. Below, you will find a brief description of each field in the mask and suggestions for completing them.

You may enter information only into fields bearing this symbol .

Fields without this symbol  are generated in the module catalog template and automatically displayed in the module description mask.

For the purpose of clarity, the following table initially includes an overview of the fields in the mask “*Modulbeschreibung – Detailansicht*”. (NB: Please disregard inconsistencies in the English translation of some fields. The English in these fields was rendered by the software programmer and cannot be edited by TUM.)

Module Details

Name	The module title must be input in both German and English (tab: Deutsch/Englisch). The English-language designation is required for the Transcript of Records.
Organization	Name of TUM school or department
Organization ID	ID of TUM school or department
Comment / Internal comment	<i>Technical information, generated automatically.</i>
Credits	Student workload expressed as ECTS Credits.
Weighting factor	Factor by which the module grade will be weighted in the graduation documents. The value input here may also be expressed in decimals, e.g. 1,25 [comma is German usage].
Duration [Acc. to SPO version]	Duration of module according to valid academic and examination regulations.
Module ID	Module IDs are assigned according to a university-wide standardized system.
Version (abbreviation)	If multiple versions of the module exist, the particular version in question will be indicated with an abbreviation.
External allocation	<i>Technical information, generated automatically.</i>
Valid from/until	This information is only necessary if it is known that the validity of the module is limited OR if you create a new version of the module description.

Allocations to SPO Versions

This information is related to the use (export) of the module in other degree programs and is generated automatically by TUMonline.

Courses and Exams

Exam node	This information (green flag icon) is generated automatically by the module catalog template. It lists all module examinations in the academic year.
Offer node	This information (red flag icon) is generated automatically by the module catalog template. It lists all course components of the module.

Descriptions

Click on this icon to open the input mask “Knotenbeschreibung – Bearbeitung”.

The tab “13W”, for example, indicates the semester in which the module description is valid, in this case, winter semester 2013. If there are multiple versions of the same module description, there will be multiple tabs with different version abbreviations. Should you wish to create a new version of the module description, you may do so by clicking on the + tab. In this case, you must enter a new “valid from” date in the “module details” mask (see above).

Export	<i>Print as HTML document</i>
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General Information (Module Catalog)

Module Level	Module level indicates the type of degree program to which the module belongs (bachelor's, master's). Each module is generally assigned to either a bachelor's or master's program. If, as an exception, a bachelor's module is offered within the scope of a master's degree program, justification is to be provided. <i>“The use of bachelor's modules in master's degree programs is permissible in certain cases, if the partial qualifications to be acquired upon successful completion of the module adequately fulfill the requirements for the overall qualification goals of the master's program. (...) It is the responsibility of the institution of higher education to ensure that no individual student is able to count the same module or a module with largely identical content toward both a bachelor's and a master's program.”¹⁰</i> The use of master's modules within the scope of bachelor's programs (e.g. in electives areas from the 5th semester and beyond)
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¹⁰Accreditation Council: Maßgaben zur Auslegung der ländergemeinsamen Strukturvorgaben. Beschluss des Akkreditierungsrates vom 12.02.2010.

	is unproblematic, as a rule, and is permitted without further justification.										
Abbreviation (DE/EN)	Note the abbreviation of the module, where applicable.										
Subtitle	If applicable, enter the module subtitle.										
Duration	How many semesters are required to complete the module? Choose from the following: one semester, two semesters, multiple semesters. <i>“The volume of module content should be limited to what is achievable in one to two semesters. In exceptional cases where a rationale is provided, a module may extend over several semesters.”¹¹</i> In keeping with its principle of continuous assessment during the course of study, the Bologna system provides for modules of one to two semesters in duration. Modules may extend over several semesters, however, if the rationale for this longer period is adequately explained, in particular, with regard to student mobility. Your reasoning for modules of longer duration is to be formally presented in the “Sequence” section of the degree program documentation.										
Frequency	This field indicates the semester in which the module is offered. Choose from the following: <table border="1"> <thead> <tr> <th></th><th>The module...</th></tr> </thead> <tbody> <tr> <td>Winter semester (WS)</td><td>... is offered regularly in the winter semester.</td></tr> <tr> <td>Summer semester (SoSe)</td><td>... is offered regularly in the summer semester.</td></tr> <tr> <td>Winter/ Summer semester (WS/SoSe)</td><td>... is offered regularly in both the winter and summer semesters.</td></tr> <tr> <td>Irregularly</td><td>... is offered based on demand.</td></tr> </tbody> </table>		The module...	Winter semester (WS)	... is offered regularly in the winter semester.	Summer semester (SoSe)	... is offered regularly in the summer semester.	Winter/ Summer semester (WS/SoSe)	... is offered regularly in both the winter and summer semesters.	Irregularly	... is offered based on demand.
	The module...										
Winter semester (WS)	... is offered regularly in the winter semester.										
Summer semester (SoSe)	... is offered regularly in the summer semester.										
Winter/ Summer semester (WS/SoSe)	... is offered regularly in both the winter and summer semesters.										
Irregularly	... is offered based on demand.										

¹¹Accreditation Council: Regeln des Akkreditierungsrates für die Akkreditierung von Studiengängen und für die Systemakkreditierung, 08.12.2009, i.d.F. 20.02.2013, p. 3.

Language	What is the language of instruction for this module? Choose from the following:	
		The module...
	German	... is taught in German.
	English	... is taught in English.
	German/English	... is taught in both German and English.
	Other languages	...is taught in a language other than German or English.

Workload

Credits or ECTS points are awarded within the scope of bachelor's and master's programs in accordance with the European Credit Transfer System (ECTS). Credits provide information about the student workload associated with the module and the achievement of learning outcomes. Workload consists of a combination of contact hours and self-study hours.

Total hours	Represents the total student workload expressed in the number of hours required to complete module requirements.
Contact Hours	Classroom time of the module courses.
Self-Study Hours	Preparation and review time for courses, self-study, independent project work, exam preparation, theses, etc.

Calculation of total student workload:

Contact Hours: Classroom presence in module courses
(1 weekly hour per semester (SWS) is equivalent to 15 contact hours per semester)

+

Self-Study Hours: Preparation and review time for courses, self-study, independent project work, exam preparation, theses, etc.

= **Total Hours**

Total hours are expressed as **credits**

(30h $\triangleq$ 1 CP)

Sample Calculations of Contact and Self-Study Hours and Credits

Module A consists of a lecture equal to 2 SWS, an exercise equal to 1 SWS and a practicum equal to 3 SWS.

Contact hours:

Contact hours at TUM are calculated on the following basis:

A course of 1 SWS or 45 mins. is equal to a full hour of work time, i.e. 60 mins. Each semester is attributed 15 course meetings (regardless of the actual duration of the semester).

So that:

(2 SWS lecture + 1 SWS exercise + 3 SWS practicum) x 15 meetings per semester à 60 min $\triangleq$ **90h**

Self-Study Hours:

Preparation and review of lecture:	25h
Preparation and review of practicum:	30h
Completion of homework (ca. 3h per week):	45h
Preparation for exam (ca. 3-4 weeks):	50h
Total	150h

Total Hours:

Contact (90h) + Self-Study (150h) = **240h**

Credits:

1 Credit $\triangleq$ 30 hours of work time $\Rightarrow$ 240h/30

8 Credits are awarded for the module.

A guide to calculating workload [currently only in German] is available under “workload” at www.lehren.tum.de/downloads.

Study and Examination Performance

Description of Study and Examination Performance	<i>See detailed description on page 15 of this manual.</i>
Type of Assessment	<i>Do not enter any information into this field. Please enter the information on type of assessment into the field above, Description of Achievement and Assessment Methods (see p.15)</i>

Duration of Assessment (in minutes)	<i>Do not enter any information into this field. Please enter the information on duration of assessment into the field Description of Achievement and Assessment Methods (see p.15)</i>
Homework	<i>Do not enter any information into these fields. Please enter the information to these fields into the field Description of Achievement and Assessment Methods (see p.15)</i>
Term paper	
Oral presentation	
Conversation	
Exam retake next semester	When may students repeat an examination? Choose from the following options: ▪ Repeat examination in following semester. ▪ Repeat examination at end of current semester. To ensure student flexibility in their studies, the APSO and FPSO specify that students must have at least one opportunity for repeat examination.
Exam retake at the end of the semester	

Description

Prerequisites (Recommended)	Level of knowledge, skills, abilities, and competencies considered necessary for the successful completion of this module. It is preferable to name a specific module, here, if possible. If there is no specific module whose outcomes can be named as prerequisites, you may list specific knowledge, skills, and competencies (also in combination with a particular module). You should be as concrete as possible in listing prerequisites, i.e. provide particular module numbers and specific competencies. Example 1: <i>Module IN0001: Introduction to Informatics 1</i> Example 2: <i>Fundamentals of power engineering taught in the first semester.</i> Example 3: <i>Knowledge of software in R/Splius</i> Example 4: <i>none</i>
Intended Learning Outcomes	<i>See detailed description beginning on page 5 of this manual.</i>
Content	<i>See detailed description on page 14 of this manual.</i>
Teaching/Learning Methods	<i>See detailed description beginning on page 12 of this manual.</i>
Media	Media, teaching material, and forms of presentation employed in module courses, e.g. reader, scripts, overheads, blog, whiteboard, exercise sheets, exercise portfolio, flipchart, PowerPoint, films, etc.

Reading List	Bibliography of specialist texts students may use for preparation and review work. Works should be listed in standard bibliographic format so that students can readily locate them.
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Organizational Information *(no section title in TUMonline)*

The information to be entered here regarding instructor, courses and degree program allocation serves to facilitate planning and organization. The actual **set up of the degree program** in the campus management system (e.g. the integration of modules into a degree program description and linking of courses and examinations to individual modules) is done in TUMonline's **SPO-Management** and is not normally the responsibility of the module coordinator. (Once the respective links have been established in TUMonline, the system generates and displays this information automatically). Information relevant to daily operations in the current semester, such as different instructors for modules taught in rotation, should be entered, as usual, in the *Course Administration* mask in TUMonline.

Module responsible	First name, last name, and email address of module coordinator.
Lecturer	First name, last name, and email address of the instructor. For modules taught in rotation by more than one instructor, the relevant instructor is to be named before the start of the semester.
Courses	You must provide the following information for <i>each course</i> of the module: Type of course: Lecture, exercise, seminar, or practicum, etc. Title: course title Weekly hours: number of hours per week per semester
Planned allocation to courses of studies	Please list all degree programs in which the module is offered as either a required or required elective module.

V. Appendix

Contact

Have you got questions about writing or modifying a module description? We are glad to help!

TUM Center for Study and Teaching
Study and Teaching – Quality Management
Arcisstr. 19, 80333 Munich
Fax: +49.89.289.25209

<https://www.tum.de/studium/lehre>

Links

<https://www.tum.de/studium/lehre/downloads>

<https://www.tum.de/studium/lehre/didaktik/lehre-gestalten/erfolgsfaktoren>

Further Reading

Akkreditierungsrat: Regeln und Beschlüsse. Studiengänge und Hochschulen. May be obtained at: www.akkreditierungsrat.de/index.php?id=beschluesse&L=1robots.txt [letzter Zugriff 07.03.2016].

TUM Center for Study and Teaching: Wegweiser zur Berechnung des studentischen Arbeitsaufwands.

TUM Center for Study and Teaching: Wegweiser Studiengangsdokumentation.

Kultusministerkonferenz: Bachelor und Master erfolgreich eingeführt. May be obtained at: www.kmk.org/wissenschaft-hochschule/studium-und-pruefung/bachelor-und-master-studiengaenge/laendergemeinsame-strukturvorgaben-fuer-die-akkreditierung-von-bachelor-und-masterstudiengaengen.html [letzter Zugriff 07.03.2016].

ProLehre: Grundprinzipien und Erfolgsfaktoren guter Lehre, Handreichung von ProLehre.

ProLehre: Constructive Alignment – Lernergebnisse, Lehrmethoden und Prüfungsformen optimal aufeinander abstimmen, Handreichung von ProLehre.

Waldherr/Walter: Didaktisch und praktisch. Ideen und Methoden für die Hochschullehre. Stuttgart: Schäffer-Poeschel, 2. erweiterte Auflage, 2014.

Supplement to Guidelines for Module Descriptions

Overview of Metrics Indicated in the Module Descriptions – Within the Coursework and Examinations Description

The information on the metrics – duration and scope of coursework and examination requirements – is indicated in the module descriptions and is necessary for an adequate description of the types of examination. It specifies the scope of coursework and examinations for the module. Because it depends on the type of examination required, an overview of the types of examinations from the examination regulations template is indicated below with the respective metrics to be specified in each case.

It is recommended that you specify the information with a $\pm 25\%$ range of the different types of work to be completed. For example: 5-10 exercise sheets, 8-16 experiments, 30-45 pages, 15-30 min. presentation. It is okay for written examinations, in particular, to include approximate information, such as “approx. 30 pages”, for example. **Exception:** Exact values must be indicated for oral and written exams.

The metrics must be specified for each type of examination. For a type of examination that can be supplemented with an exam element such as a presentation, providing the metrics for this element is optional. For example: 5-10 page report, supplemented with a presentation of approximately 10-20 minutes. Indicating the minutes for the presentation is optional and not required. It is sufficient to state “5-10 page report, supplemented with a presentation”.

Type of examination (for examination and coursework requirements)	Excerpt from the examination regulations template § 41(1)	Information on metrics in the module descriptions
Written exam	¹ A written examination is a supervised examination, in which students are expected to demonstrate, within a limited amount of time and using predefined methods and resources, their ability to identify problems, find solution strategies and, if required, implement them. ² The duration of written examinations is provided for in § 12(7) of the General Academic and Examination Regulations (APSO).	Duration in minutes
Laboratory assignment	b) ¹ Depending on the discipline, laboratory assignments may include experiments, measurements, field work, field exercises, etc., with the goal of students conducting such work, evaluating results, and gaining knowledge. ² These may consist of, for example, process descriptions and the underlying theoretical principles including the relevant literature; preparation and practical implementation; calculations, if required; and documentation, evaluation, and interpretation of the results in the context of the knowledge to be gained. ³ Laboratory assignments may be complemented by presentations designed to demonstrate a student's communication competency in presenting scholarly work to an audience. ⁴ Details of each laboratory assignment and the related competencies to be examined are set out in the module descriptions.	Number of experiments, measurements, etc.; where applicable, indication of the specific parts (with weighting); information on the length of a supplemental presentation is optional

Type of examination (for examination and coursework requirements)	Excerpt from the examination regulations template § 41(1)	Information on metrics in the module descriptions
Practical credit requirement/ Tests	c) ¹Practical credit requirements (tests where applicable) involve students completing assigned tasks (for example, solving mathematical problems, writing computer programs, preparing models, etc.) using theoretical knowledge to solve application-oriented problems. ²Exercises are designed to assess a student's factual and detailed knowledge and its application. ³Practical exercises may be administered in writing, orally, or electronically. ⁴This may be in the form of homework, exercise sheets, programming exercises, (digital) tests, tasks within the scope of higher education internships etc. ⁵The specific parts of the respective practical credit requirements and the competencies to be examined are listed in the module description.	Number of exercises (exercise sheets), assigned tasks, etc.; indication of the specific parts (with weighting)
Report	d) ¹A report is a written record and summary of a learning process for the purpose of presenting the acquired knowledge in a structured way and analyzing the results in the context of a module. ²Students are expected to demonstrate that they have understood all essential aspects and are able to present them in writing. ³Reports may include excursion reports, internship reports, work reports, etc. ⁴The written report may be complemented by a presentation for the purpose of assessing the student's communication competency in presenting scholarly work to an audience.	Number of pages, words or characters of the report; where applicable, indication of the specific parts (with weighting); information on the length of supplemental presentation is optional

Type of examination (for examination and coursework requirements)	Excerpt from the examination regulations template § 41(1)	Information on metrics in the module descriptions
Project work	e) ¹Project work is designed to reach, in several phases (initiation, problem definition, role assignment, idea generation, criteria development, decision, implementation, presentation, written evaluation), the defined objective of a project assignment within a given period of time and using suitable instruments. ²In addition, project work may include a presentation in order to assess a student's communication competency in presenting scholarly work to an audience. ³Details of the respective project work and the competencies to be assessed in each examination are set out in the module descriptions. ⁴Project work may include group work. ⁵Students are expected to demonstrate that they are able to complete the tasks in a team environment. ⁶A student's contribution to group work which is to be assessed as a component of an examination must be clearly identifiable and gradable. ⁷This also applies to each individual's contribution to the group result.	Length of time in minutes or number of pages, words or characters; indication of the specific parts (with weighting); the metrics must be given for the main element of the examination; information on additional smaller examination elements (such as a presentation) is optional

Type of examination (for examination and coursework requirements)	Excerpt from the examination regulations template § 41(1)	Information on metrics in the module descriptions
Research Paper	f) ¹A research paper is a written assignment in which students work independently on solving complex scholarly or scholarly/application-oriented problems, using the scientific methods of the related discipline. ²Students are expected to demonstrate that they are able to solve problems corresponding to the learning results of the module in question in compliance with the guidelines for scholarly work – from analysis and conception to implementation. ³Research papers, differing in their requirement standards, may take the form of a conceptual framework/theory paper, abstract, term paper, seminar paper, etc. ⁴The research paper may be complemented by a presentation and/or a colloquium for the purpose of assessing the student's communication competency in presenting scholarly work to an audience. ⁵Specific details on each research paper and the related competencies to be assessed are set out in the module description.	Number of pages, words or characters; where applicable, indication of the specific parts (with weighting); information on the length of supplemental presentation or colloquium is optional

Type of examination (for examination and coursework requirements)	Excerpt from the examination regulations template § 41(1)	Information on metrics in the module descriptions
Presentation	g) ¹A presentation is a systematic and structured oral performance supported by suitable audio-visual equipment (such as projector, slides, posters, videos) for the purpose of demonstrating and summarizing specific issues or results and paring complex problems down to their essential core. ²For the presentation, the student is expected to demonstrate that he or she is capable of preparing a certain topic within a given time frame in such a way as to present or report it in a clear and comprehensible manner to an audience. ³In addition, the student is expected to demonstrate that he or she is able to respond competently to any questions, suggestions or discussions brought by the audience and relating to his or her subject area. ⁴The presentation may be complemented by a brief written precis. ⁵The presentation can be held either as an individual or group examination. ⁶A student's contribution to group work which is to be assessed as a component of an examination must be clearly identifiable and gradable. ⁷This also applies to each individual's contribution to the group result.	Length of time in minutes; where applicable, indication of the specific parts (with weighting); information on the additional written precis with the number of pages or characters is optional
Oral Exam	h) ¹An oral examination is a timed, graded discussion on relevant topics and specific questions to be answered. ²In oral examinations students are expected to demonstrate that they have reached the qualification objectives laid out in the module descriptions, understood the central concepts of the subject matters covered by the exam, and are able to apply them to specific problems. ³The oral examination will be held either as an individual or group examination. ⁴The duration of the examination is regulated in § 13(2) of the APSO.	Duration in minutes

Type of examination (for examination and coursework requirements)	Excerpt from the examination regulations template § 41(1)	Information on metrics in the module descriptions
Learning portfolio	i) ¹A learning portfolio is a collection of written materials compiled by the student according to predefined criteria that exhibits the student's progress and achievements in defined content areas at a given time. ²Students are required to explain according to which criteria they have chosen the materials and their relevance for their learning progress and the achievement of the qualification objectives. ³With the learning portfolio, students are expected to demonstrate that they have taken active responsibility for their learning process and have reached the qualification objectives set out in the module description. ⁴Depending on the module description, types of independent study assessment in a learning portfolio may include, in particular, application-oriented assignments, web pages, weblogs, bibliographies, analyses, conceptual framework/theory papers, as well as the graphic representation of facts or problems. ⁵The specific components of each learning portfolio and the related competencies to be assessed are set out in the module description.	Number of contributions; indication of the specific parts (with weighting); the metrics must be given for the main element of the examination; information on additional, smaller, examination elements is optional
Parcours exam	j) ¹The parcours examination is made up of several components. ²Unlike a module examination component, parcours exam components are administered in sequence and completed in a specific time frame and location. ³Parcours components entail various types of examination formats, which together evaluate the competency profile of the module as a whole. ⁴Possible types of examination in parcours components include those listed in a) through i). ⁵The total duration of the parcours examination with all its components is indicated in the module catalog; the type and duration of individual components is specified in the module description.	Indication of all examination elements; indication of the specific parts (with weighting), including the length of time and scope of the individual elements

Supplement to Guidelines for Module Descriptions

Overview: Types of Courses

In cooperation with TUM CST-QM, HR 1 prepared an overview of the different types of courses, including information on the *calculated group sizes based on capacity* as well as the weighting factors in accordance with the Bavarian Ordinance on Teaching Load (LUFV).

The *calculated group size based on capacity* is the group size that is estimated in general within the scope of the capacity utilization statistics. It can be used as a reference value or to calculate the number of required small groups for a seminar or exercise module. The group size is currently not specified by law.

The different types of modules/courses, their descriptions and information on group sizes are reference values and are intended to give you an overview of the possible options available for designing academic instruction.

If you have questions regarding the column for the *calculated group size based on capacity* and the *weighting factor (LUFV)*, please contact HR 1; if you have questions regarding the column for the *description*, please contact the CST-QM division.

Type of event (abbreviation in TUMonline)	Description/ Guidance for classification according to LUFV	Calculated group size based on capacity	Weighting factor LUFV
Lecture (VO)	A lecture is teacher-centered, frontal instruction in which university educators give oral presentations. It serves to introduce a subject, convey basic knowledge or deepen students' knowledge of a subject. Contextualized basic and special knowledge or methodical knowledge is conveyed during oral presentations by instructor(s).	100	1.0

Type of event (abbreviation in TUMonline)	Description/ Guidance for classification according to LUFV	Calculated group size based on capacity	Weighting factor LUFV
Exercise Module (UE)	Depending on the subject, an exercise module is understood to mean a large lecture hall exercise, smaller frontal instruction courses, or smaller course offerings with significantly active participation of the participants. In particular, the difference between an exercise module and a seminar depends on the subject. This means students systematically work (usually concurrent with the semester or program) on the subject matter, they gain or expand their knowledge and skills, and are trained in subject-related methods. The instructor leads the course/module, assigns tasks, checks students' work/implementation, and leads the discussion. Students practice skills and methods, work on contributions, present their contributions, discuss tasks and solve problems. In the exercise module, the structure can range from "instructors predominantly playing the active role and limited participation of students" to "students playing a significant and active role and instructors assuming the role of moderators". The interaction between instructors and students, as well as the size of the exercise module, depends on the subject.	30	1.0
Lecture with integrated exercise modules (VI)	Teacher-centered, frontal instruction alternates with lecture hall exercises. Students are not separated into small groups when going through the exercise contents.	100	1.0

Type of event (abbreviation in TUMonline)	Description/ Guidance for classification according to LUFV	Calculated group size based on capacity	Weighting factor LUFV
Seminar (SE)	A seminar is a course with a significant but varying active share of participants for teaching/expanding/practicing knowledge, skills and methods. Students actively participate by doing work on the assigned work/exercises in the form of presentations and oral reports, for example. Seminars can also include technical programming or practical lab work/exercises. The difference between a seminar and exercise module depends on the subject (cf. exercise module). Seminars can also cover individual and group (preparation) work, and students' findings are presented and discussed. The instructor assumes, among other things, responsibility for directing, controlling, distributing and correcting students' work. Generally speaking, there is extensive interaction between instructors and students.	20	1.0
Introductory seminar (PS)	See Seminar (SE). The two seminar forms, introductory seminar and advanced seminar, imply different academic progress (e.g., for bachelor's, master's or doctoral students). The schools may chose the type of seminar to be used. Introductory seminars are designed more for students with basic knowledge, while the advanced seminars are intended for students with a discipline-specific concentration.		
Advanced seminar (HS)			

Type of event (abbreviation in TUMonline)	Description/ Guidance for classification according to LUFV	Calculated group size based on capacity	Weighting factor LUFV
Project (PJ)	Usually, only one topic/task is assigned, which is to be worked on individually or in groups. Furthermore, the instructor plays a less active role in a project than it does in a seminar; in a project, the active participation of students plays the predominant role. In general, the structure of projects is very broad, which is why it must be examined in each individual case whether the nature of the project is more in line with a seminar (project seminar) or a practical course.	15	0.5

Type of event (abbreviation in TUMonline)	Description/ Guidance for classification according to LUFV	Calculated group size based on capacity	Weighting factor LUFV
Practical course (PR)	The practical course is intended for doing internal program- or semester-related work in a lab, testing stations or experiment facilities with the aim of carrying out practical work and experiments. In this course, work on specific tasks takes place over a longer period of time, usually as part of group work. A practical course usually encompasses teaching and deepening theoretical foundations; setting-up, implementing, assessing and analyzing tests; and drawing conclusions from the practical work. For the most part, students work independently and are predominantly pro-active. Instructors assign tasks, monitor students, offer assistance and assess students' work. In this way, they encourage autonomous use of research methods, independent documentation of scientific findings, and analysis and critical discussion of the results. A weighting factor of 0.3 is possible if there is less intensive supervision. External practical courses (internships) cannot be recognized as part of the teaching load. In the event the external practical course is partially undertaken externally, only the internal part will count towards the teaching load.	15	0.5

Type of event (abbreviation in TUMonline)	Description/ Guidance for classification according to LUFV	Calculated group size based on capacity	Weighting factor LUFV
Practical course in research (FP)	The research-oriented practical course has small group sizes in which students do a great share of their own research work. Instructors assign tasks, monitor research work using the latest work methods, and give insight into scientific working methods, as well as current procedures and processes. Students learn how to deal with problems using a practical research approach, how to work in labs or with machines and how to apply scientific methods; they also experience setbacks, learn to use them for other projects, and practice presenting the results in academic formats. In cases where more extensive time and effort is required for supervision (as a result of handling hazardous substances/expensive machines), the weighting factor may also be set at 0.5 where applicable.	15	0.3
Excursion (EX)	An excursion is considered a form of visual instruction conducted outside of the university or an exercise held on the premises as part of an academic 'field trip'. The instructor leads the event and demonstrates objects for observation; students carry out exercises/practical work, make observations, apply their acquired knowledge and methods, and draw conclusions about their work.	15	0.3

Type of event (abbreviation in TUMonline)	Description/ Guidance for classification according to LUFV	Calculated group size based on capacity	Weighting factor LUFV
Colloquium (KO)	The final colloquium (Bachelor, Master) usually encompasses a presentation of the project, a thesis and an oral defense of the thesis within the broader discipline. Students present a scientific topic independently and in a structured manner, and are able to defend their work and justify their decisions and assessments. Instructors assign work, as well as monitor and assess it. Students predominantly play an active role with their academic oral presentation and participation in the subsequent discussion. Instructors coordinate the colloquium, supervise presenters, introduce the presentation and lead the discussion. Colloquiums that are only undertaken for examination purposes and are held in front of examiners without other students present are not recognized as a course.	15	0.7
Exam preparation course (RE)	The exam preparation course is a discussion group in which the instructional content is reviewed in a small group of participants. Instructors assign work, as well as monitor and assess it. Students predominantly play an active role.	15	0.7
Clinical rounds (KL)	Clinical rounds is a bedside teaching model in the School of Medicine and Health.	3	0.5

Type of event (abbreviation in TUMonline)	Description/ Guidance for classification according to LUFV	Calculated group size based on capacity	Weighting factor LUFV
Workshop (WS)	A workshop is a course for a limited, short period of time, in which a small group works intensively on a topic. The distinguishing factor of a workshop is the cooperative and moderated way in which students work towards a common goal. These aspects set it apart from other teaching formats: It is focused on one topic, it has fewer contributions and includes longer discussions after contributors' presentations. Workshops should not be used instead of seminars.	15	0.3
Tutorial (TT)	Tutorials are student-led tuition in which advanced students (tutors) deepen their knowledge with participants and practice their skills. Depending on the nature of the course, the formats used by academic staff are to be classified as an exercise, seminar, exam preparation course or colloquium (etc.); only these formats can count as part of the teaching load. As a matter of principle, tutorials cannot count as fulfillment of an instructor's teaching load.	n/a	-