TUM Teaching Constitution

December 2018

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Photo: Albert Scharger, TUM Historical Archive

Scientiis et Artibus – Science and the Arts

The inscription above the entrance portal at TUM from the year 1916 expresses the university's comprehensive educational mission.

TUM Teaching Constitution

The President's Foreword

The Technical University of Munich (TUM) is committed to uniting excellent research with excellent teaching: Teaching on the pulse of science.

The superlative reputation of our graduates bears testimony to our successful union of professional training with cutting-edge research. The current Times Higher Education (THE) "Global University Employability Ranking" has ranked TUM 6th worldwide — framed by Stanford and Princeton. In the "Academic Ranking of World Universities" (ARWU, Shanghai Ranking), we have been included in Germany's top trio year after year.

The following **TUM Teaching Constitution** has been drawn up in response to the recommendations of the German Council of Science and Humanities in 2017 to document our institution's self-concept as a place of learning and teaching. Taking our 2011 **teaching mission statement** as its starting point, the TUM Teaching Constitution goes a step further by providing a detailed set of transdisciplinary guidelines and principles of instruction drawn from current scientific, technological, social and didactic developments. In particular, we account for the new challenges and possibilities arising from digitalization that complement the range of contemporary instructional approaches, both in terms of teaching content and format.

This document serves as the basis for concrete and binding goals for the continued enhancement of teaching at TUM, which have been defined collaboratively by the TUM schools and departments, together with the Integrative Research Centers. **TUM AGENDA 2030** heralds our commitment to the large-scale expansion of the humanities, social and educational sciences in an effort to imbue our graduates with an understanding of the social impact of our respective disciplines during their studies. A "Human-Centric Engineering and Future Design" thus replaces the traditional, narrowly disciplinary focus of educational content and structures with inter- and cross-disciplinary education (Scientiis et Artibus) that will prepare our graduates for the future.

Munich, 10 December 2018

Wolfgang A. Herrmann

1. Social Mandate

In keeping with its mission as a **servant of society** and **innovation engine** to the economy, TUM bears the responsibility to prepare young talents to identify and structure existing and future social, economic, technological and scientific challenges and **to shape progress** in accord with the **latest scientific insights and methods**.

TUM is committed to uniting excellent research with excellent teaching. **Teaching on the pulse of science** means the continual adaptation of our students' **competency profiles** to current scientific development in order to tap its benefits for society as a whole. It means introducing young talents to scientific methods and discourses, awakening their curiosity and enabling them to acquire competencies independently. Moreover, it means making them aware of their individual boundaries, as well as those of their discipline, and fostering in them an attitude of personal responsibility in action.

TUM bears a great **responsibility** towards its now approximately 40,000 students from all over the world. These young people have entrusted themselves to our institution at a decisive point in their lives in the hope of developing into responsible professionals and leaders, with the guidance and support of some of the world's top scientists.

As a leading university with a **strong research focus and an international orientation**, TUM holds a unique position within Germany's **multi-faceted education system**, which provides different educational paths to foster individual strengths accordingly. Within this structure, the university fulfils a **dual mandate** to provide a comprehensive range of degree programs to meet the broad societal need for highly skilled academics (broad education) and to meet the needs of top talents (education for the top). TUM aims to play a leading role in both aspects of this dual mandate.

As one among various possible paths of higher education, TUM carefully balances these dual objectives[I] in careful consideration of its responsibility to find the best fit for a **diversely talented pool of applicants**. We strive to identify among prospective students those most suited for our programs and, in some cases, point to more viable alternatives in the German higher education system.

Only by taking seriously the unique responsibility arising from its dual social mandate can our **internationally networked**, **high-tech location** be prepared to face the challenges of the future.

2. Mission Statement and TUM Teaching Constitution

In 2011, the Technical University of Munich formulated interdisciplinary didactic guidelines for the following ten fields of action in its **teaching mission statement**:

- Sound scientific approach
- Skill- and outcome-based education
- Individuality
- Inspiring instruction, active student involvement
- Internationality
- Innovation
- Quality orientation
- Joint responsibility
- Gender & diversity
- A setting conducive to learning

(www.lehren.tum.de/en/en/topics/effective-teaching/basic-principles/mission-statement)

The **TUM Teaching Constitution** expands and specifies the 2011 teaching mission statement by formulating university-wide principles for teaching, drawn from current scientific, technological, social and didactic research. Based on these principles, competency profiles, curricula, teaching and examination methods, as well as the organization of studies, undergo continual development at all levels, from individual modules to degree programs through to our schools and departments and beyond to university-wide measures and research on teaching.[II] This process is guided at the operational level by concrete goals to be redefined at five-year intervals[III] by the TUM schools and departments, together with the integrative research centers (IRC) and the university board of management on the basis of internal and external expertise. Long-term regulatory systems are in place to address everything from the structuring of curricula to the implementation and operation of degree programs.

3. Principles for the Development of Competency Profiles

All degree programs at TUM are based on defined **competency profiles**. These profiles and the courses designed impart the competencies defined therein are developed by the schools and departments and IRCs with a view to the latest scientific developments and to not only existing career paths for university graduates but newly emerging paths based on developments within disciplines, as they grow to address new social challenges. Competency profiles reflect changes in patterns of learning, behavior and thinking, as well as the interests and priorities of the young people they are intended to prepare for the future. As such, they account for social change, scientific progress and the specific talents and motivations of the future designers of our society. Competency profiles are regularly scrutinized and refined to continually update and enhance the courses in our degree programs.

The interplay between the **continued development of traditional** and the **creation of new competency and career profiles** is integral to TUM's self-understanding and prerequisite to fulfilling the university's mission as an innovation engine to the economy.

The following principles apply to the development and continued enhancement of competency profiles:

1. Competency profiles are developed for the **timeframe of decades**, taking into account an ever changing and expanding knowledge society. As such, our competency profiles produce sustainable outcomes that enable TUM graduates to make a continued contribution to our knowledge society over the course of their careers. This requires that the **competencies** defined in course profiles be visibly anchored[IV] in relevant scientific fundamentals and approaches of respective disciplines and continuously checked for their **relevance** vis-à-vis existing and anticipated developments. They must identify invariable essentials, while learning from the errors and uncertainties of the past. At the same time, they must be **flexible** enough to adequately face the challenges of the future not yet recognizable today and sufficiently **abstract** as not to fall prey to fashions and trends.

2. Profiles encompass **disciplinary and extradisciplinary competencies** oriented on the ideal of the critical, responsible member of civil society and on the fundamental developments and technology-driven transformations of society.[V]

3. The nature of **teaching** required to achieve the learning outcomes defined in competency profiles must go beyond conveying the distinct content of individual modules to reflect an understanding of the interconnectedness of the individual elements of the degree program, **as a whole**. While the modularization of studies improves transparency and facilitates student mobility, instruction must keep sight of the overarching competencies that students acquire at **different speeds through different learning processes** over the entire course of their studies.[VI]

4. The competency profiles developed at TUM define **target competencies** to be acquired by program graduates. These are defined based on the requirements of society and those of the university's dual mandate. From them, in turn, we define **prerequisites** (in part, propaedeutic) for first-year students, whose applications are carefully reviewed in **admission processes** in order to ensure that target competencies are achievable within the standard period of study.

5. The allocation of degree programs to individual schools and departments must lead neither to unnecessary limitations nor to unclear or redundant competency profiles. Dialogue on the development of **degree programs involving multiple schools and departments** must take place university-wide, within the schools, departments and IRCs and beyond their boundaries. TUM has established overarching structures to ensure that **disciplinary and internal structural boundaries do not impede the development of new innovative degree programs**.[VII]

6. Competency profiles are realized in degree program curricula. The **proactive, constructive cooperation of all teaching staff** and their contributions to the departmental committee for student affairs are essential for the ongoing development of course offerings. Each member of the teaching staff contributes his or her expertise in a **bottom-up process** to continuously update curricula based on the principles formulated here. The addition of **newly appointed colleagues** becomes a catalyst for rethinking established traditions.

7. Competency profiles and course offerings are examined and updated at regular intervals through TUM's internal re-accreditation, which incorporates **external expertise**. In this process, fundamentals are to be supplemented or replaced, outdated content removed, redundancies eliminated or didactically justified. Identifiable deficiencies in the description of professional fields, new questions and new scientific findings must be considered. However, skills and abilities that can be acquired by graduates as a matter of course as they enter their professions should not form part of academic instruction.

4. Principles for the Selection and Advancement of Students

Students – their individual talents, interests, enthusiasm and learning capacities – constitute the focus of teaching. TUM assigns great value to informing, advising, selecting and supervising its students, in keeping with the following principles:

1. TUM informs and advises prospective students and assists them in identifying their interests, aptitudes and talents before taking up their studies. It thus provides support in their search for the **best-suited educational path**.

2. TUM assumes **responsibility** for **recognizing** among prospective students all of those **individual talents** with the capacity to meet the demands of the competency profiles of our degree programs.

3. TUM assumes responsibility for addressing as large a **pool of talents** as possible and offers English-language degree programs to facilitate access for international applicants and prepare students for careers in globalized markets and intercultural teams.

4. In **diversity management**, TUM identifies potential disadvantages and responds with specific solutions to the challenges of an increasingly diverse national and international applicant pool and student body.

5. As course offerings are oriented towards defined target competencies, TUM has established methods to **identify applicants' suitability** for our degree programs in order to ensure students have the capacity to achieve degree program objectives.

6. The **early phase of bachelor's programs** takes on particular significance in determining students' suitability for the degree program. Essentially suitable students who are unable to keep apace with the requirements early in their studies are offered additional support (i.e. enable). As a rule, bachelor's students are expected to have successfully completed all modules of the first academic year within four semesters; those who have not are deemed unsuited[VIII] (i.e. and challenge).

7. TUM fosters its students in the development of their **individual talents and interests**.[IX] Students are advised in their choice of curricular and extracurricular opportunities, which are continuously expanded to meet students' needs.[X]

8. TUM promotes the individual development of **particularly high-performing students** through structured supplementary programs that go beyond the compulsory curriculum.

9. TUM involves its **students as partners in the collaborative effort** to continually enhance teaching, quality management and the operative implementation of teaching formats. This is achieved through active participation in committees[XI] that deal with questions concerning academic and student affairs, as well as through systematically collected feedback at the level of individual courses and degree programs.

10. TUM maintains its relationship to its students even **after their studies** and creates appropriate communication structures and formats for this purpose.[XII]

5. Principles for the Recruitment and Development of Faculty

Good teaching results from the interaction of competency goals, course content, the awareness and targeted use of teaching formats, conditions of teaching and study, and the individuality of responsible teachers and students. Standardization would contradict the very nature of quality university instruction, which can only exist where the authenticity of all those involved is possible.

Good teaching requires **competent teachers** with profound knowledge of the complex factors contributing to the success of teaching, learning and examination processes, who are willing and able to assume responsibility for applying this knowledge independently in their everyday teaching and examination activities. TUM places the competence and motivation of its teaching staff in the focus of its **continuing education, advising and support programs and combines these measures with systematic quality management**. It is guided by the following principles:

1. In its **selection of new teaching staff and professors**, TUM carefully considers applicants' level of competence, commitment and prospective development in teaching. TUM's appointment process requires applicants to document their individual teaching portfolio.

2. TUM provides excellent conditions and incentives[XIII] to **foster motivated teaching** in its faculty members. This includes the cultivation of a teaching culture that promotes university-wide dialogue, pursues the mutual enrichment of teaching and research (teaching on the pulse of science) and palpably conveys the joys and benefits of such a university culture to its young talents.[XIV]

3. All teachers are provided with instruments for the analysis and **assessment of their teaching competence**, as well as comprehensive **support and advisory services** in order to meet the demands of modern university teaching. TUM's resources for the continued education and training of its teaching staff are oriented on the standards of the German Association for Educational and Academic Staff Development in Higher Education[XV] and the possibilities in **new media offered by digitalization**. Teachers who make use of these resources can document their teaching competence by earning certificates.[XVI]

4. **Systematic course evaluations** provide feedback to teachers on the impact of their teaching. **QM circles** serve as a site of dialogue on this feedback, where measures for improvement can be drawn up, as necessary.[XVII] In the case of above-average evaluations, measures can be taken, such as nominations for teaching prizes, invitations to a publication or a lecture, in order to propagate "best practices" and success factors for good teaching. Annual **quality reports**[XVIII] are discussed in the Academic Affairs Board, the Academic Affairs Council, the schools and departments and TUM Board of Management. A summary of the quality reports is also published.

5. Course design should enable the development of **specific talents and potential outreach of individual teachers** to maximum effect.[XIX] This aspect is taken into account in the distribution of teaching within the schools and departments.

6. Principles for the Continued Enhancement of Teaching

TUM is a place where students and scientists from all over the world come together in vibrant intellectual exchange. In this regard, face-to-face instruction characterized by personal interaction, for which new digital teaching formats now offer innovative spaces, plays an important role.

University education must impart the learning competencies required for successful professional life using modern learning formats. The ability to learn independently and efficiently is essential not only for successful university studies but for lifelong learning, both personal and professional.

The supervision and support of student independent study thus lies at the heart of university instruction. Accompanying analyses of teaching and learning processes serve as instruments for directing and optimizing learning success.

Here, TUM is guided by the following principles:

1. The acquisition of the competencies aspired to in a university course of study requires, above all, intensive, supervised **independent study**.[XX] This means students must be able to motivate, discipline and organize themselves. **Classroom instruction** is intended, in turn, to direct, reinforce, flank, supervise and intervene, to provide optimal support for students in their learning progress and to promote collaborative learning among one another.

2. In particular, **face-to-face instruction** provides students orientation and structure. It helps students set goals and motivates to achieve them. It monitors student learning and provides ongoing feedback[XXI], provides stimulus for independent study and interactive learning with other students, particularly in the cognitive domains of abstraction and concept formation, of problem solving and creative thinking, i.e. in acquiring the higher order competencies of learning taxonomies.

   Pure knowledge transfer and skills acquisition can only be initiated and reinforced in classroom teaching. The former take place predominantly through independent study activities before and after face-to-face instruction. Teaching and learning activities of the classroom, thus, are always linked to the learning activities of independent study (**blended learning**).

3. **Cross-curricular formats** (block courses, transdisciplinary modules) create a network of thematic concerns pursued at multiple locations across multiple schools and departments to promote collaboration in interdisciplinary learning groups.

4. **Online formats** enable cross-curricular teaching independent of location. They can be used to connect different disciplines, or to prepare students for future work in global teams through virtual collaboration. In purely online formats, important functions of classroom teaching (structuring, motivation, feedback, learning atmosphere, flow experiences, group dynamics) are reconstructed in virtual space. These elements can be flanked by periods of face-to-face instruction, such as block formats, project work or seminars.

5. Digital tools are available for both classroom teaching and independent study. **Interactive tools** enable formative feedback and collaboration even in large groups. **Collaboration tools** support students, who are separated by time or place, to work together in learning groups. **Simulations and RemoteLabs** offer students the opportunity to gain practical experience in complex environments even outside of defined periods of classroom instruction. **Conventional, electronic and interactive teaching and learning materials** – including teaching videos and course recordings – support independent learning. The inclusion of **external content** makes it easier for teachers to integrate up-to-date and professionally prepared teaching materials.[XXII] The use of these resources is inherent to life and work in a global knowledge society; it **shifts the focus of teachers' activity from producing material to sorting, structuring and evaluating knowledge, as well as the assessing the quality of external sources**.

6. **Examinations** are designed to document the acquisition of competencies (competence-oriented examination) and, so, avoid a skewed emphasis on only selected knowledge and skills. Teachers must design examinations in line with course learning objectives and in light of the learning activities employed in the classroom (**constructive alignment**).

7. **Electronic examinations** enable teachers to integrate multimedia content and simulations into examinations,[XXIII] to simplify the organization and correcting of exams, and even to design forms of assessment independent of time and location.

7. Principles of Quality Management

University teaching and learning processes are highly dynamic and individual, characterized by considerable heterogeneity. The **TUM quality management (QM)** system forms the overarching framework for the TUM Teaching Constitution and the competency-oriented teaching and learning processes it is intended to govern.

The **QM evaluation system** is designed to obtain information not as an end in itself, but rather to serve the goal-oriented management of studies and teaching. Course evaluations at regular intervals provide feedback to instructors. Degree program evaluations give students and graduates the opportunity to assess their programs with regard to conception, operation and effectiveness, as well as strategic development. At the departmental level, the focus is on dialogue among faculty members, with the inclusion of external expertise.

Information relevant for the (continued) strategic development of degree programs flows into the discussion of future stages of development. Information gained from this flows into a plan-do-check-act-cycle (PDCA), in which measures are developed, their implementation monitored and their success tracked.

TUM's QM system is transparent. It is regularly reflected upon and further developed with regard to its effectiveness and in dialogue with all TUM actors involved.

8. Implementation of the TUM Teaching Constitution

By the end of the summer semester 2019, the implementation of the teaching constitution will be discussed with the schools, departments and IRCs and specific goals defined. Every five years, a conference (Academic Affairs Board, Academic Affairs Council) will be held across all TUM schools and departments to determine if the teaching constitution must be updated to reflect current developments.

The Senior Vice President – Academic and Student Affairs and the Deans of Studies make annual progress reports to the Academic Affairs Council. A summary of the reports is submitted to the TUM Board of Management, which makes the essential decisions, where necessary, in dialogue with the TUM Board of Trustees.

Footnotes

[I] Bachelor‘s and master‘s degree programs full-time, consecutive, part-time or continuing education, state examination-programs, elite degree programs and doctoral programs.

[II] For example, programs such as “Focus on Teaching,” “Agenda Lehre,” “Open University,” and “Internationalization 2.0”; research of the TUM School of Education and TUM Medical Education; development projects from the Teaching Funds and Innovation Funds.

[III] The five-year cycle results from the internal re-accreditation of degree programs, as well as from the five-year duration of tuition substitution funds proposals.

[IV] This means, for example, no isolated knowledge of facts, standards or formulas.

[V] These are addressed both in individual modules and integrative teaching formats (e.g. project weeks), additive teaching formats (e.g. plug-ins, mentoring) and extra-curricular activities for competency and personal development (e.g. TUM: Junge Akademie) An expansion of the humanities, political sciences and social sciences (TUM AGENDA 2030) is planned for this purpose.

[VI] E.g. competencies in the shaping of digitalization, abstraction skills, dealing with fuzzy variables, classification of model boundaries, inclusion of other disciplines.

[VII] An increasing number of subject areas are being addressed trans- and multi-disciplinarily.

[VIII] Exceptions are made for special life circumstances (e.g. illness or family care), which are to be determined in individual cases.

[IX] E.g. about advisory services, preparatory courses, introductory programs, online preparatory courses (MOOCs for Masters, etc.), development of self-assessment measures, etc. in cooperation with the Vice President for Talent Management and Diversity; possibly progress tests, such as those used in medicine.

[X] E.g. Language Center, Carl von Linde Academy, Humanities, Social and Political Sciences, Plug-Ins.

[XI] E.g. Departmental Committee for Student Affairs, Senate, Quality Circle, Academic Affairs Board, Academic Affairs Council, teaching retreats (TUM Higher Education Symposium).

[xii] E.g. Alumni work, invitations to university festivals, mentoring programs bringing together alumni and students, further scientific training.

[xiii] E.g. teaching funds and innovation funds, teaching prizes, as well as development of specific career paths in teaching.

[xiv] E.g. Academic Affairs Council and committees, teaching forums and retreats.

[xv] See www.dghd.de/praxis/standards-fuer-die-praxis

[xvi] In particular, the Bavarian Higher Education Teaching Certificate, which is offered at the introductory level (60 hours), intermediate level (120 hours) and advanced level (200 hours).

[xvii] If results are noticeably below average, e.g. Teaching Analysis Poll (qualitative evaluation and feedback method), teaching visits, didactic counselling interviews.

[xviii] Annual reports on procedures and results of the quality management of TUM Academic and Student Affairs.

[xix] E.g. through teaching supported by empathic personalities in the large fundamentals modules of the bachelor‘s degree programs, which combine the acquisition of competency with additional insights into the discipline and arouse enthusiasm and curiosity among young talents; through block formats integrated into the course of the semester with the interaction of teaching personalities with different backgrounds, questions are examined with particular intensity; offers by top scientists for small groups of top talents within the scope of research-based learning in the master‘s degree program; teaching formats with practical references from industrial cooperations.

[xx] The workload calculation for the credits already provides for this, 30 hours of work are calculated per credit, which are divided into classroom and independent study time and in which classroom teaching already represents the smaller proportion.

[xxi] Formative Feedback, Just-In-Time-Teaching

[xxii] E.g. integration of textbooks, external instructional videos or simulations, Massive Open Online Courses, live video links to external experts, professionally produced infographics.

[xxiii] E.g. Video analyses, programming tasks

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