

Learning and Teaching Standards Technische Universität Darmstadt

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Preliminary Remarks

These learning and teaching standards are the result of wide-ranging discussions at TU Darmstadt. They take into consideration many years of positive developments in learning and teaching at TU Darmstadt. They build upon active participation of all actors involved and face new national and international challenges head on. The standards are directed chiefly at faculties and departments of the TU, as well as at members of the university and its various groups and decision-making bodies. These standards result in guidelines and quality objectives for the further development of existing Bachelor and Master degree programs, and for the development of new Bachelor and Master degree programs, including teacher training modules.

The Standards

TU Darmstadt is committed to the concept of a university as a community of students and instructors, as well as a place of scientific research and teaching. This also includes deliberate discussions of the current state of affairs in particular areas (*Research through Learning*), as well as furthering the development of knowledge through active cooperation (*Learning through Research*).

The basis of all standards for the development of learning and teaching at TU Darmstadt is an extremely high level of technical excellence: We strive for our graduates to receive superior academic qualifications which stand at the cutting edge of the newest research. The goal of learning and teaching at TU Darmstadt is to encourage students' personal development, to encourage respectful, cooperative behavior, to establish a culture of openness and to foster transparency in curricula university-wide.

Academic Excellence assumes that:

- Students experience a theoretically well-grounded scientific education based on the latest research findings
- Graduates have mastered the basic facts, concepts and methods of their area, which they can in turn apply to new problems
- Students acquire the ability to retrieve knowledge and learn to plan and implement their own research projects
- Graduates possess the necessary motivation, knowledge and ability to identify new problems and then to develop new concepts and methods to solve them
- Graduates are able to illustrate ideas, approaches and solutions comprehensibly in both spoken and written form. They are also able to work together in international contexts with experts from their own and other disciplines.

Personal Development entails that

- Students are trained to be creative and critical thinkers, as well as responsible members of both the TU Darmstadt community and society as a whole
- Learning and teaching have students as the center of focus (*student-centered*)
- A respectful and fair relationship is maintained between instructors and students
- Learning and teaching orient themselves towards students' future qualifications (*learning outcomes*)
- Individualized, flexible and independent programs of study be encouraged and supported

A Culture of Openness consists of openness towards

- Other technical specialties and the active pursuit of interdisciplinarity
- Other nationalities and cultures (*internationality and interculturality*)
- Research (*research orientation*)
- Applications in career and society (*practical orientation*)
- Innovative forms of teaching, learning and testing (*innovation*)
- Constructive criticism, aiming towards on-going quality improvement (*quality culture and quality management*)

Curricular Transparency for Students comprises

- Creating an atmosphere conducive to a trouble-free, timely and at the same time challenging program of study
- Ensuring that every degree or study program can be successfully completed in a timely manner
- Providing supportive infrastructure and a variety of academic counseling options
- Establishing and supporting a reasonable transition between school, university and career

Commentary on Standards

Academic Excellence

TU Darmstadt considers itself a university where research and teaching are equally valued and closely interconnected. This interconnectedness is reflected in academic study programs in which high-quality and well-informed instruction conveys cutting-edge scientific research. Student education emphasizes the successful transmission of the most important foundations and theories of a specific area. Research methods and practices are explicitly introduced in the early stages of programs, particularly in Bachelor degree programs, with the help of dedicated instructional and didactic methodology. The goal is for graduates to have obtained a solid grounding in the essential facts and methods of their field and then to be able to use these as tools in finding practical solutions to technical and career-relevant problems. In addition,

students learn to think analytically, systematically and abstractly and to apply their abilities and insights to solving crucial problems in research, science and society. Students are able to understand and appreciate the connection between their own and other disciplines and are able to assess the theoretical and practical consequences for the environment and society.

Graduates will be able to effectively illustrate and demonstrate ideas and solutions, establish new areas of inquiry, and develop new approaches, methods and results using research as a tool. In addition, they will recognize the demand for information, how to satisfy this demand and to quickly adapt to new tasks, which might also require working in cooperation with experts from their own and other fields in international contexts.

Focus on Personal Development

TU Darmstadt particularly aims to attract high-level and highly-motivated students. This applies not only in the case of German students, but for international students as well, both men and women. On the one hand, the university expects a high level of participation from its students and, on the other hand, offers students a supportive and inspiring academic atmosphere, an essential part of which is a body of instructors who are not only experts in their fields, but are also competent instructors. The particular needs of international students must also be taken into account. It is important that relationships between students and instructors are respectful and fair.

The university aims to encourage the development of creative and critical thinkers who, as a result of a challenging study program, have developed a broad range of specialized and generalized competencies, including key qualifications, competence in gender¹ and diversity² issues, and also participate actively in tasks beneficial to society. The acquired competencies will allow graduates to take on scientific, career and social challenges in a responsible manner, and to work successfully in international cooperative contexts. It is expected from students that they see themselves as responsible members of both TU Darmstadt and society in general. Graduates are expected to show commitment to their alma mater and to global society.

Teaching and learning are to be understood primarily as concepts of goal-oriented communication between instructors and students and as a means for the development of competencies in challenging learning/teaching situations. Learning takes place through active participation in teaching events at TU Darmstadt, fundamentally underpinned by independent and autonomous learning in non-academic contexts.

Culture of Openness

¹Gender competence refers to the ability to acknowledge and orient oneself towards relevant aspects of gender and gender equality.

² Diversity competence refers to the ability to deal adequately and fairly with a range of individual differences in ethnicity, religion, world view, gender, age, disability and sexual identity.

Openness through Interdisciplinarity

TU Darmstadt offers Bachelor, Master and teacher training degrees which integrate elements of engineering sciences, natural sciences, humanities and social sciences. Issues of technology play significant roles in various ways. Some important curricular innovations include the interdisciplinary study programs (e.g. interdisciplinary specializations, the faculties of Computational Engineering and Information Systems Technology). TU Darmstadt considers excellence in a discipline as a key to excellence in interdisciplinarity. It is also important for students to participate in courses outside their discipline during their introductory level studies. Multi- and interdisciplinary degree components, including complementary disciplines (i.e. mid-level and high-level interdisciplinarity, according to the working definition for TU Darmstadt) should be integral parts of study programs at the Bachelor and Master levels.

Multi- and interdisciplinary degree components can be organized in various ways:

- Existing courses within disciplines that are complementary with regards to content and didactic style can be imported individually or in module form
- Service courses from complementary disciplines can be developed specifically for interdisciplinary programs; TU Darmstadt intends to make this the rule, rather than the exception
- Interdepartmental and cross-faculty courses will be specifically developed and team-taught by instructors from various disciplines, with an emphasis on courses that integrate open-ended projects and tasks
- Courses which are explicitly ‘interdisciplinary’ in nature (e.g. ‘interdisciplinary degree specializations’) will be officially accredited and integrated into departmental program requirements. These courses will also place particular emphasis on open-ended projects and tasks.

Openness through Internationality and Interculturality

Internationality and the closely-related concept of interculturality are becoming increasingly important in today’s global society. Study programs at TU Darmstadt are aimed at fostering the international orientation of its students. This outlook is promoted through one-semester study abroad programs. When so desired, every student should have the opportunity to participate in a study abroad program. With the cooperation of our partner universities, it is possible for students to complete a degree within the normal period of time. For this reason, it is crucial that respective courses completed abroad be accredited by departments and faculties at TU Darmstadt. Students are prepared for their semester abroad through language and intercultural courses at TU Darmstadt.

The proportion of foreign students currently studying at TU Darmstadt is already particularly high, compared to other German universities. TU Darmstadt will continue to remain open to qualified foreign students and to further develop its course curricula and student support programs. A continuing crucial component of this effort includes German as a Foreign Language (*DaF- Deutsch als Fremdsprache*) courses offered by the Language Learning and

Resource Centre (*Sprachenzentrum*). TU Darmstadt also plans to augment lectures and courses offered in English, especially during introductory phases of degrees, and to encourage early cooperation and communication between German and international students.

Openness through an Orientation towards Research

TU Darmstadt considers both the Bachelor and Master degrees to be research-oriented and scientifically/technically-demanding programs. Components which allow students to participate in research projects at early stages and which support learning in research-related environments are integrated into course curricula. Research-oriented learning contexts and methods include the following:

- Courses and seminars which lead to independent project and group work (e.g. projects with open-ended tasks)
- Small group seminars and courses for individual students that employ project and team work and are led by research scientists (e.g. participation in experimental projects in the fields of natural sciences, conducting research semi-autonomously)
- Courses and seminars whose goal is the publication of scientific research results

As many courses as possible will place their main emphasis on exploring challenging issues in scientific research fields. It is not only important for students to become familiar with the relevant research and applications of a field; they must also be capable of formulating new and creative research questions.

Openness through Practical Orientation

Study programs at TU Darmstadt are oriented towards the future responsible social and career practices of its graduates. Courses and seminars are thus made available that definitively encourage this orientation, including project seminars and internships. In addition, students are offered career-oriented courses, allowing students to prepare for potential future career options.

Openness to innovative teaching, learning and testing methods

TU Darmstadt is open to innovation and takes part in national and international activities geared towards the improvement of teaching and classroom methodologies. Innovation is also encouraged in maintaining a consistent, competence-oriented perspective in the design of study and degree programs, in the systematic implementation of goal-oriented improvements in teaching, learning and testing situations, as well by encouraging the development of students who think independently and flexibly. Communication and cooperation both among students and between students and instructors/teaching staff is also to be encouraged. Open-ended and challenging teaching and learning situations are to be fundamental components of curricula. Examination methods are to be tailored to the suitable assessment of overarching, key qualifications of students. Particular emphasis is laid upon the image of TU Darmstadt as a “Dual Mode” University, where traditional teaching methods and net-based teaching methodology go hand in hand. The autonomous learning competence and interactive abilities

of students are systematically supported through a growing proportion of E-Learning opportunities. These ever-increasing net-based learning forms also ensure that respective study programs are able to be completed in a timely and efficient manner. It is TU Darmstadt's goal for a large percentage of its lectures and courses to be included under the E-Learning label, and to document all courses in a digitally sustainable manner.

Openness to Constructive Criticism (Quality Management)

The quality of teaching and learning can be measured chiefly by the degree to which students have been able to acquire the intended competencies required for responsible scientific, social and career-oriented applications. Another basic measuring tool is whether the various degree and study programs can be generally successfully completed within the foreseen number of semesters. In this regard, TU Darmstadt adheres to the suggestions put forward by the Committee on Scientific Research and the University Presidents Conference (*HRK – Hochschulrektorenkonferenz*) in 2008.

TU Darmstadt plans to implement a process of quality management for its learning and teaching opportunities that will qualify it for systematic accreditation. This will occur at the program and departmental level, as well as at the faculty level. In order to achieve this goal, elements of an overall *culture of quality* will be developed, whose contents will be publicized in the TU Darmstadt community. A culture of quality within the areas of learning and teaching includes, besides academic and continuing education programs commensurate with a university, a commitment to quality education by all teaching personnel, beginning at the student teaching assistant and tutor level, through doctoral and post-doctoral candidates, up to the professorial level.

Successful completion of a degree program

The overriding goal of faculty and departmental study programs is to enable students to make a timely and successful transition into future careers, whether in business, industry or in doctoral programs. All students who have completed a Bachelor degree will be offered the opportunity to begin a Master degree program.

The Bachelor degree programs take three years to complete, with an additional two years for a Master degree program. The programs are broken down into modules. A module is a thematically determined teaching and learning unit consisting of specified, consistent learning outcomes, concluding with an examination. For successfully completed modules, the appropriate number of credits will be awarded, in accordance with the European Credit Transfer System (ECTS). The courses (modules) and examinations are timed so that the course and study loads of students are evenly distributed over the academic year. Examinations are organized so that exams that must be retaken do not hinder students' timely completion of their study programs. Students who invest the necessary amount of time should be able to complete their degree within the intended amount of time. The amount of time and effort required to complete a degree program should also be flexible enough to allow students to postpone completion, giving them the opportunity to participate in voluntary projects outside of their degree program.

The goal of all faculty and departmental study programs at the TU Darmstadt is for as high a proportion of students as possible to complete their Bachelor and Master degrees. At the same time, the educational goal of TU Darmstadt is for as many students as possible to progress from a Bachelor into a Master degree program. For this reason, recipients of Bachelor degrees will be encouraged to apply for a Master degree program.

Study programs and instruction at TU Darmstadt will provide the organization and infrastructure necessary for students to achieve competency goals, with the necessary course flexibility and a strong emphasis on individual, personalized learning trajectories. This entails making sure that adequate space is available for lectures, (particularly for student project and work groups), libraries and learning centers on the TU Darmstadt campuses. An important part of improvements in infrastructure includes a broad palette of E-learning opportunities which will increase flexibility in course times and locations and make courses more attractive for students with children.

Academic counseling is offered by instructors, departments and faculties and at TU Darmstadt as a whole. An IT-supported campus management system ensures that the organization of study programs, instruction and examinations are user-friendly for students.

In the introductory, initial phases of their study programs, in addition to orientation sessions, students will be introduced to small, mentored study and work groups, focused motivational events (such as semester projects and courses that are designed to improve key qualifications needed for academic endeavors), and to a well-functioning mentoring system (including both student and professional mentors).

Potential candidates for Bachelor degree programs are encouraged to apply for enrollment at TU Darmstadt through close cooperation with schools and admission information sessions. TU Darmstadt will outline which competencies and types of focus are expected from new students. Departments and faculties at TU Darmstadt offer welcome and counseling sessions (and information on the selection process in faculties which only accept a restricted number of students) to all applicants. In addition, flexible transitions into Master programs will be encouraged and promoted for all Bachelor degree recipients.

Faculties and departments in the humanities and social sciences (in which the drop-out rate for female students is particularly high), as well as in the faculties of engineering and natural sciences (in which the number of female students is underrepresented even at introductory stages) are working in particular to attract encourage and support female students, using all appropriate means.