General Information:

- Department: TUM School of Management
- Program name: Management and Technology
- Degree: Master of Science (M. Sc.)
- Standard Duration of Studies (Credits): 4 Semesters and 120 Credit Points (CP)
- Form of study: Full-time attendance program
- Admission: Aptitude Assessment
- Start of program: Winter semester (WS) 2017/2018
- Language: English, German/English – depending on the engineering or natural science focus
- Main Location: Munich
- Additional Information: Double-Degree-Program with HEC Paris available
- Responsible for the program: Academic Program Director
  - Prof. Dr. Thorsten Pachur
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- Version/Status of: 08.02.2023
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1 Objectives of the degree program

1.1 Purpose of the degree program

The vision of the TUM School of Management is to become one of the leading institutions for the education of managers at the interface of engineering and natural sciences, so that the talents educated here can contribute to meeting our societal challenges. Underlying this goal is the recognition that the interdependencies between business sectors have increased dramatically. The change in corporate organizations and cultures and the associated dissolution of traditional departmental boundaries are an expression of this development. These changes naturally also massively affect the required profiles of the actors acting in this context.

In practice, a lack of knowledge of the other specialist discipline and a lack of understanding of the other specialist culture lead to communication and know-how barriers. Managers with a high level of responsibility or the entire organization are regularly called upon to solve holistic challenges which, by their nature, cannot be assigned to just one discipline. At least a solid understanding of the way colleagues in different fields work and think is the key to successful leadership and performance on the job. Working in interdisciplinary teams with business economists, engineers or natural scientists has become the standard for high-performance companies. Decisions at the interface between management, engineering and natural sciences are becoming the standard. Knowledge that encompasses more than just business skills is required to translate the views of the various disciplines into adequate management decisions. One example of a frequently encountered challenge is the ever-increasing use of software or technology to solve business problems. In order to be able to make competent decisions about the procurement and use of these, it is crucial for managers to have a solid basic understanding of how they work. One example of a job description is the product manager, who is becoming increasingly important in many companies (start-ups as well as established companies). In this interdisciplinary role, the processes for the development and production of customer-oriented products or services are coordinated, for example in the development of software. In this context, it is crucial for the manager to have the appropriate competencies to (1) understand the respective markets and customers or their needs ("What do they really want and how much would they pay for it?"), (2) assess the possibilities of technical feasibility ("Can our software do this and, if so, when and at what cost?"), and (3) finally, to be able to manage the possible processes of implementation up to the product offering. This is an example of a role that requires knowledge and skills in different areas, but also the ability to manage processes at the interface.

The Master in Management and Technology program addresses this fundamental interdisciplinary challenge. It trains interface experts who, in addition to in-depth knowledge of business administration, are taught fundamental knowledge of an engineering or scientific field. Their knowledge of elementary technical or scientific interrelationships and of the design of the associated development and production processes enables them to assess situations and make correspondingly well-founded decisions. Great importance is attached to methodical and process-related management tools, which are used to design processes and promote interdisciplinary thinking and action at the interface between economics and engineering and scientific areas of the company.

The goal is to have graduates who are able to understand and analyze engineering or scientific problems and integrate them into the context of a business operation.
1.2 Strategic importance of the program

The TUM School of Management offers a comprehensive portfolio of study programs, including its Bachelor, Master and professional study programs. This reflects the idea of lifelong learning and implements the mandate of the Bavarian Higher Education Act ("Bayerisches Hochschulgesetz") to offer degree courses and professional education.

A strategic goal of the TUM School of Management is to provide outstanding skills in management as well as the acquisition of engineering or scientific competencies. Graduates should learn to develop and integrate solutions across disciplines and acquire a broad range of skills for their careers after graduation. The goal of the TUM School of Management is to transform enthusiasm for innovation and technology into tangible results by teaching the necessary management skills. An interdisciplinary teaching approach is used to train future managers who are equally comfortable working with management experts, engineers, and natural scientists.

An internationally oriented management education should be the foundation of the higher education of our future shapers of social change: In this regard, the TUM School of Management is committed to imparting professional and interdisciplinary competencies for an evolving, technology-driven knowledge society, thus fulfilling its mission as a driver of innovation for the economy.

The previous education and thus the different admission requirements of our applicants shape the different programs of the TUM School of Management, which can be divided into four categories according to their content:

1) Interdisciplinary management programs focusing on natural sciences, engineering and/or life sciences: These include the bachelor's program in Management and Technology (formerly TUM-BWL) at the Munich campus and the Heilbronn campus, the bachelor's program in Sustainable Management and Technology at the Straubing campus, the master's programs in Management and Technology (formerly TUM-BWL), Finance and Information Management, and Consumer Science at the Munich campus, the master's program in Management and Digital Technology (starting from summer semester 2024) at the Heilbronn campus, and the master's program in Sustainable Management and Technology at the Straubing campus.

2) Programs for students who are looking for basic management training to complement their bachelor’s degree after completing their first degree in the natural, engineering or life sciences: The master's program in management at the Munich Campus and the Heilbronn Campus fall into this category.

3) Programs in the area of continuing education for applicants with one to three years of professional experience: This category includes the Master's program in Management and Innovation (Double Degree HEC) at the campus in Munich as well as the Master's program in Management and Innovation (TUM Track) at the campus in Heilbronn, which have young professionals with initial professional but not (yet) any management experience as their target group.

4) Programs in the area of continuing education for applicants with more than three years of professional experience: This category includes the MBA programs Executive MBA, Executive MBA in Business and IT, and Executive MBA in Innovation and Business Creation at the Munich campus, which have professionals with (initial) management experience as their target group.

The program portfolio of the TUM School of Management is shown in Figure 1.
Figure 1: Program portfolio of the TUM School of Management at the university locations in Munich, Heilbronn and Straubing: Bachelor's programs (dark blue), Master's programs without work experience (gray), continuing education programs with work experience (light blue), MBAs with work experience (green).

The School divides its research and teaching activities into five areas of expertise: (1) Economics & Policy, (2) Finance & Accounting, (3) Innovation & Entrepreneurship, (4) Marketing, Strategy & Leadership, and (5) Operations & Technology. Students of the Masters in Management and Technology can deepen their knowledge of economics (from their previous bachelor studies) in different domains during their studies. In doing so, they can sharpen their profile to match their intended career goals.

In addition, the program is also in line with TUM’s mission statement of being an entrepreneurial university. Numerous contents of the study program deal with innovations, entrepreneurship and business start-ups. In addition, it is a central concern of the study program to also promote the entrepreneurial spirit of students.
2 Qualification profile

The qualification profile complies with the requirements of the Qualifications Framework for German Higher Education Qualifications (Hochschulqualifikationsrahmen - HQR) according to the resolution of the German University Rectors’ Conference and the conference of ministers of education of 16.02.2017. According to the HQR, the qualification profile of the Master Management and Technology can be defined on the basis of the requirements (I) Knowledge and Understanding, (II) Use, Application and Generation of Knowledge, (III) Communication and Cooperation and (IV) Scientific Self-conception/Professionalism. The formal aspects according to HQR (entrance requirements, duration, degree options) are detailed in chapters 3 and 6 as well as in the corresponding subject examination and study regulations.

The standard duration of the Master in Management and Technology program is 4 semesters (120 credit points) and qualifies students for doctoral studies.

It can be studied as a consecutive degree program after the bachelor's degree program in Technology and Management-oriented Business Administration (TUM-BWL) or Management and Technology at the TUM Heilbronn Campus of the Technical University of Munich, following a primarily business-oriented bachelor's degree program or following a bachelor's degree in Economics. Thus, on the one hand, it builds on the specialist and methodological knowledge and competencies already acquired in the field of economics, and on the other hand, it also builds on basic knowledge in the field of mathematics and natural sciences or, depending on the orientation of the bachelor's degree program, also on the basic knowledge and competencies already acquired in the technology focus.

Depending on the individual design of this study program, different profiles of graduates result in combination with the entry profile:

- Graduates with highly specialized knowledge of economics to take on planning and organizational tasks with management responsibility in traditional business departments of companies.
- Graduates with special industry-related knowledge (in Energy Markets or Life Sciences Management & Policy) who have built a special analytical profile by feeding from the business management fields.
- Graduates who have well-founded, in-depth engineering and/or scientific knowledge (in the fields of chemistry, mechanical engineering, electrical engineering and information technology, computer science, computer engineering, industrial engineering or sustainable energies), in particular due to knowledge and skills already acquired in the bachelor's degree in a selected technical discipline.
- Graduates who possess broad-based, multidisciplinary competencies in both management and technology and who strive for management responsibility.

Needless to say, the training provided within the framework of the degree program will ensure the ability to conduct economic research, especially in the areas and interfaces mentioned above.

The competencies taught in the Master in Management and Technology program are described in detail in the following chapters 2.1 - 2.4.
2.1 Knowledge and understanding

In the context of profile formation, a distinction can be made between (1) management area and (2) technical or scientific area. In the management area, students can optionally take a specialization or choose an overarching education. In the technical or natural science area, a focus is selected within the framework of which the acquired competence profile (minor or major) results from the previous knowledge of the respective bachelor's degree program. In detail, this profile is as follows:

The profile in the (1) management area is formed by acquiring knowledge in a management specialization or in a broader acquisition of management competencies in various management disciplines.

Graduates of the Master in Management and Technology have broadened and deepened professional and methodological competencies in theory and practice in specialized areas of business administration such as innovation and entrepreneurship, management and marketing, economics and econometrics, finance and accounting, operations and supply chain management, or in the industry-specific areas of energy markets or management of life sciences. Optionally, they can apply and further develop the concepts as well as the empirical and analytical methods in a management specialization.

Students who do not choose an explicit management specialization strengthen their cross-disciplinary subject and methodological skills. This can also include training in the knowledge and application of terms and methods in related fields that are also relevant to business administration students, such as economics, law, and the interrelationships with business issues.

Graduates will also have a critical understanding of key principles and methods in a self-selected technical specialization (either chemistry, computer science, electrical and information engineering, mechanical engineering, computer engineering, industrial engineering or sustainable energies).

The professional competencies in the (2) technology specialization result from the level at which the corresponding education takes place. Graduates who take a so-called "minor" in the technology specialization have acquired basic competencies in their subject. Graduates who take a so-called "major" in the technology specialization can - depending on the intensity of the study - also apply concepts of their subject and, in the case of high study intensity, also develop them further. The choice of whether to take the "minor" or the "major" in the respective subject is up to the students. Since the preceding bachelor's degree program in Management and Technology (TUM-BWL) or Management and Technology at the TUM Heilbronn Campus of the Technical University of Munich is preceded by a course of at least 42 CP in the corresponding field, the recommendation with regard to prior knowledge for taking a "major" is the same number of credits. For students who enter this Master's program directly from the Bachelor's programs mentioned above, it is not possible to take a "minor" corresponding to the chosen major in the Bachelor's program (e.g. the choice of major "Chemistry" in the Bachelor's program and major "Chemistry Minor" in the Master's program is excluded).

Below is a more detailed explanation of the specializations with respect to their content in the minor and the major:

The Chemistry Minor imparts fundamental scientific knowledge in the field of chemistry. Graduates possess elementary knowledge of general and inorganic chemistry, organic chemistry, biology and biochemistry, physical and technical chemistry. In addition, they have the necessary mathematical
and physical fundamentals to be able to evaluate chemical issues correctly. They also have an overview of basic biochemical and molecular biological principles and techniques. In addition to this original chemical content, this concentration also provides basic knowledge in related areas such as chemical software, materials science, toxicology or legal studies for chemists.

In the **chemistry major**, students further develop their undergraduate chemistry knowledge and also gain advanced knowledge in various areas of chemistry such as food chemistry, aerosols, industrial chemical processes, or construction chemistry. Graduates also gain applied knowledge, for example, through the practical application of technical chemistry.

In the **Electrical and Information Technologies Minor**, students learn the basic elements of electrical engineering and information technology. They understand and know how to apply basic physical principles of these fields. They also gain knowledge and comprehension of the associated basic problem-solving methods. Students are then able to reproduce learned knowledge and apply simple systems based on the basic elements themselves. In the further course of study, students deepen the application orientation of these competencies, for example with the topics of energy, photovoltaics, communication technology or nano electronics. Here, students get to know concrete engineering problems and their solution approaches, apply them in an engineering-like manner and can intensify the interlocking of management and an engineering science in an interdisciplinary context.

In the **Information Technology and Electronics Major**, graduates build on their foundational knowledge in this area and also gain advanced knowledge in various areas of information technology and electronics, such as multimedia, technical acoustics, or telecommunications networks. Graduates also gain applied knowledge through, for example, the practical application of multimedia, nanotechnology, or energy and high-voltage engineering.

Graduates who have chosen the **Power Engineering Major** are familiar with the most important processes and methods of energy generation, storage and transmission and are able to classify and evaluate them. Their specialized knowledge enables them to recognize innovations in the field of electrical energy supply and to evaluate their potential. They are also able to work independently on complex projects in the field of power generation and supply. They are familiar with power plant construction and power plant technology and are able to interface with all related disciplines. In their work, graduates are always aware of the technical, ecological and economic dimensions of energy systems. They are familiar with the highly competitive energy market and are able to apply economic evaluation methods. They work in project teams, assume responsibility and coordinate the interdisciplinary cooperation of different disciplines.

In the **mechanical engineering minor**, students learn basic mechanical engineering subjects such as technical mechanics, machine drawing, machine elements, production technology and information technology. On the basis of technical mechanics, students are taught the ability to formulate and solve mechanical questions in engineering-scientific problems independently on an abstract mathematical level. Within the framework of the basics of machine drawing and machine elements, this knowledge is now transferred to complex technical drawings, so that students are able to work out solutions for manufacturing, load and assembly-compliant construction of components, select and design suitable machine elements and display them using CAD systems. In the introduction to production technology, the basic connections of production processes along a production line are taught.
In the specialization in Mechanical Engineering Major, students further expand their basic knowledge and acquire further, application-related knowledge in different fields of mechanical engineering. Graduates focus their individual profile on topics such as production and logistics, the automotive industry or energy technology.

Graduates of the Informatics Minor have basic knowledge of a programming language (e.g. Java, SQL, C) and object-oriented principles. They know the procedure for the development of software and can transfer known procedure models to a context of action. They understand different approaches to database design as well as some database systems and query languages. They know the different types of information systems, their components (e.g. man-machine communication, attributes) and areas of application (e.g. navigation system) and are able to apply practical modeling techniques to different decision situations (e.g. process optimization, cost-benefit calculation). They possess fundamental knowledge of reference models and are able to design software architectures at the system level. Graduates also possess technological competencies: They understand the interaction of hardware and software and know the elements and methods in the field of computer architecture and operating systems. They know the theoretical foundations of data modeling and can design databases and integrate them into information systems. They can analyze, model and implement distributed systems and design and use middleware.

In the Informatics major, students continue to build on their foundational computer science skills. They deepen their programming skills and learn how to transfer them to real-life practical situations in application modules. Students also acquire fundamental knowledge in advanced areas of computer science such as artificial intelligence and robotics or IT security.

In the Computer Engineering Minor, students acquire knowledge of fundamental concepts such as representation of data, functions, objects, languages, algorithms, architecture of computer systems, information management, information engineering, data analysis and visualization, programming languages, electronics and control theory. Linking to this, students learn the basic elements of electrical and information engineering, particularly in the form of analog circuits, electric, magnetic fields, and direct and alternating current applications. They are then able to recognize the interrelationships of their major, reproduce learned knowledge and apply simple systems based on the basic elements themselves, for example in the form of circuit analysis or the application of signal processing methods to simple data sets. Since the concentration is offered entirely in English, students can also apply the aforementioned competencies in English.

In the Computer Engineering Major, students further expand their fundamental knowledge and also acquire advanced, application-related knowledge in various areas of computer technology. Graduates place individual emphasis on topics such as artificial intelligence, the design of technical devices, and mobile communications. Since the major is offered entirely in English, students can also apply the aforementioned competencies in English.

Graduates with a Industrial Engineering Minor have fundamental knowledge in the design, control and improvement of production and logistics processes. Students are familiar with the latest developments in the production process and know how to integrate them into the processes of companies. They are able to analyze methodical processes, structures and systems and to derive recommendations for action for a more efficient and/or effective design. A cornerstone of this is the understanding and interpretation of stochastic methods and data analysis for decision-making. Graduates are able to apply these concepts in practice and apply the methods to real life and industrial applications.
Students also understand the weaknesses and strengths of the methods. They are able to assess which method to apply in which context. Students will also be able to use appropriate software appropriately. Since the concentration is offered entirely in English, students will be able to apply the above competencies in English.

The Sustainable Energies Minor provides graduates with the basic principles of the most important renewable energies. They can describe the challenges of a renewable energy system and explain the main technical, physical and economic interrelationships of the respective technology and understand them from a system perspective. Students will be able to select suitable solution variants from the technologies covered for common applications and the associated common problems. They are able to evaluate renewable energy generation in relation to electricity markets and the need for control power, apply suitable instruments and methods for analyzing, planning or controlling energy systems and interpret and evaluate results from applied models. The students are also familiar with the ecological, economic and, where applicable, social effects of the technologies implemented and can explain their occurrence.

2.2 Use, application and generation of knowledge

Graduates of the master's program are able to develop solutions to problems at the interface between economic issues and their technical specialization using solution approaches from both disciplines. They are able to apply or transfer the imparted specialized knowledge and methodical solution-finding competence in the field of management as well as at the interface to the chosen technical or natural science focus to further-reaching, profound and complex problems and tasks. The methodological competencies include, in particular, the acquired research skills. Graduates of the Master's Program in Management and Technology are able to identify and design current research questions of the underlying disciplines, choose concrete ways of operationalizing research and justify them, select research methods and justify the choice, and transfer them into results and interpret and communicate them critically. Due to the practical orientation of TUM, graduates can also use these competencies to generate knowledge in the business environment, e.g. in the field of business development or in new and spin-off companies.

2.3 Communication and cooperation

Graduates are able to take on management tasks within the framework of complex and internationally oriented projects with an economic-technical focus. Graduates are familiar with the different discussion cultures and languages of the specialist disciplines and have a pronounced awareness of possible inter- and transdisciplinary conflict potentials. To a certain extent, they thus also assume a "translator" function in the company. In particular, they are able to reflect and integrate different perspectives of (business) economically and technically oriented stakeholders and to take these into account in their decisions. This means that they are able to involve relevant technical experts and knowledge carriers in solving business problems, to address the respective challenges in dialog with the individual groups and to achieve an efficient solution in the interests of the company despite the groups' often different communication cultures. The reflection of the different ways of thinking leads to a synthetic, constructive solution. Graduates are able to apply their knowledge and skills in professionally and culturally heterogeneous work groups or project teams.
in a goal-oriented manner. Since up to 100% of the course is taught in English, graduates are also able to communicate in English with confidence.

2.4 Scientific self-conception/professionalism

Graduates of the Master's program have acquired the competence to set a goal based on their strengths, weaknesses and interests and to work towards it through a targeted selection of subjects. Furthermore, they have proven that they can work persistently on challenging projects (e.g. Master’s Thesis). Graduates are capable of a fundamentally professional attitude and responsible performance of the tasks assigned to them. In this context, graduates draw on the acquired skills of reflection, critical questioning and evaluation of familiar circumstances and the ability to place social and entrepreneurial expectations in an ethical and moral context.

Graduates have learned to think entrepreneurially and can contribute to the economic success of a company in a leading position as technically competent managers. Regardless of the combination of specializations, graduates are able to take on challenging positions at the interface between technical business areas, such as production and product development, and commercial areas, such as accounting or marketing.
3 Target group

3.1 Target group

The target group for the Master's program in Management and Technology are outstanding graduates of the Bachelor's program in Management and Technology, of a comparable first degree program at the interface of economics and management and engineering/natural sciences or of a first degree program in economics with a high affinity for technology from Germany and abroad with a very good command of English. Knowledge of economics, management, basic mathematical and logical skills, knowledge of relevant research methods and, if applicable, knowledge of engineering and natural sciences acquired in the bachelor's program are of particular interest. The high number of applicants since the introduction of the Master's program in Management and Technology demonstrates the attractiveness of Master's programs at the interface between economics and engineering/natural sciences for both students from interface programs and graduates of purely economics-based Bachelor's programs.

3.2 Prior knowledge of applicants

An aptitude assessment procedure ensures that applicants have the necessary knowledge of the field of basic management science, statistics and mathematics as well as empirical methods and quantitative procedures used in business administration to successfully complete the degree program. Prerequisites are in-depth knowledge in business administration, basic knowledge in statistics / empirical research methods and in mathematics. Graduates of a college or university from selected countries that are not signatories to the Lisbon Convention are additionally required to provide evidence of specialized knowledge in the form of a "General Management Admission Test" (GMAT).

Competence in problem-based application to issues at the interface of engineering/science and economics as well as competence in scientific work and clear and concise reasoning skills are also required. The eligibility procedure is regulated in detail in the statutes of the program and set out in detail. After evaluation in the first stage, applicants are either admitted immediately, rejected, or their essay submitted with the application is used for evaluation, depending on the score achieved.

The Master's program can be completed entirely (Computer Engineering and Industrial Engineering) or partially in English, depending on the choice of the technology specialization. Therefore, very good English skills are a prerequisite for a successful application. These are already checked upon receipt of the application by means of language certificates. Graduates of the Bachelor in Management and Technology with the choice of the major in Computer Engineering thus have the opportunity to study in English throughout until they obtain the Master's degree in Management and Technology.

3.3 Target figures

Currently, the TUM School of Management educates approximately 39% of its students at Bachelor level and 55% of its students at Master level, as well as 6% of its students in Executive Education (as of October 2021).
Since an aptitude assessment procedure is carried out in the Master's program in Management and Technology in order to select applicants with the right fit for the interdisciplinary program, it is not possible to give an exact target number. Starting in the winter semester 2022/2023, this aptitude test will be supplemented by the GMAT as an admission requirement for students from selected countries in order to achieve a better fit between applicants and the target group. The program is basically designed for annual freshman cohorts of about 650 enrolled students (as of October 2021). In the winter semester 2020/21, 464 students and in the summer semester 2021, 261 students started their studies in the Master Management and Technology at TUM.

The development of the absolute number of students in the Master of Management and Technology between 2017 and 2021 is shown graphically in Figure 2.

![Figure 2: Development of the absolute number of students in the Master of Management and Technology between 2017 and 2021 (as of October 2021)](image)

This is divided along the recruitment process into applications - admissions - acceptance of the study place - immatriculation. The Master Management and Technology was introduced in the winter semester 2017/2018. However, in the summer semester 2017, the programs Technology and Management-Oriented Business Administration (TUM-BWL) and Business with Technology (WITEC) were offered for the last time, which resulted in a large increase in applications in the winter semester 2017/18 due to "switchers" from the two old programs to the Master in Management and Technology. Since 2019, there has again been an increase in the number of applications. It is also apparent that on average, approximately 30% of applicants ultimately enroll in the Master's in Management and Technology. The adjustments to the selection process with a standardized and comparable GMAT for students from selected countries are expected to improve the aptitude testing of applicants and thus decrease to the previous target numbers while improving the quality of applicants.

The projection for the development of the expected student numbers is based on the assumption of constant quality as well as constant or increased awareness of the program (e.g. through inter-
national awards such as the QS Ranking 2022, in which the Master in Management and Technology reached 23rd place, or the annual Financial Times Masters in Management Ranking in which it reached 49th place in 2021). Another factor is the exploitation of the international market. The program has a very high attractiveness for international students due to its character and high study ability in English. Currently, the proportion of international students at the Munich campus is 66%. Exploiting the undoubtedly high potential of the international study market will be a lever to keep the student numbers of the Masters in Management and Technology at TUM Campus Munich constant in the long term.
4 Demand analysis

Competencies at the interface between management and technology are more in demand than ever in times of technological change. Compared to pure business economists, engineers or natural scientists, these profiles always have a major competitive advantage on the labor market when positions are to be filled that are characterized by the interaction between business administration and technical or scientific corporate areas. Particularly at the interface between business and technical or scientific corporate areas, however, practice is characterized by high know-how and communication barriers caused by a lack of expertise and insufficient understanding of the other area. Industry experts, employers, and graduates of the previous Master's program in Management and Technology confirm the great competitive advantage of a course of study that establishes language skills between business people, engineers, and natural scientists.

Issues of sustainability, responsibility and ethics have moved to the forefront of technological innovation, economic development and global business conduct. In the face of increasingly complex societal challenges and global megatrends - from the impact of digitization or climate change on society, to population aging, the fight against hunger and poverty, and the energy transition, to the stability of global financial markets - business schools around the world are responding to growing demand from students, employers, and other stakeholders by placing these issues at the center of their education.

The TUM School of Management recognizes that interdisciplinary education and the search for ways to successfully balance economic, societal, and technological goals is a critical skill for future leaders at the nexus of business and technology, and critical to building the necessary societal trust on which successful management practice will depend in the decades to come.

Graduates of the Master's program in Management and Technology are qualified to work in various functional areas such as accounting, marketing, organization, financing, controlling or human resources. Potential employers include start-ups as well as established companies or consulting firms in diverse fields such as technology, IT, automotive, mechanical engineering, chemicals, as well as auditing and tax consulting firms and management consultancies. They are also predestined to take on generalist management tasks in these areas.

The ability to work at the interface between management and the technical areas of a company has been repeatedly emphasized in the past by both the company representatives of the TUM Career Service Center cooperation companies and the members of the Advisory Board of the TUM School of Management as a major competitive advantage for employees.

In the meetings of the Advisory Board, the board members often even emphasize the necessity of hiring graduates with a business focus and technical understanding in order to fill innovation-intensive company areas such as research and development with them and to be able to make the knowledge gained economically usable.

The expert Burkhard Schwenker, long-time head of the management consultancy Roland Berger, also makes the following claim about business administration in an interview for Wirtschaftswoche, in which the classic business administration course is put to the test: "Narrow-track teaching is no longer sufficient today," he says. One focus of good business administration education, he says, is
interdisciplinary."\(^1\) In the same article, Klaus Friedrich Schmiedgen, head of training at SAP in Germany, highlights the importance of the need for cross-functional skills: "As a software company, we are clearly focused on digital transformation, and a basic understanding of this is essential for all SAP employees."\(^2\)

The orientation of this degree program takes these assessments into account and addresses them - with a combination of management vs. technology of 70 % to 30 %. The Master's program in Management and Technology thus offers graduates the best prerequisites for mastering these new challenges at the interface between business administration and engineering or natural sciences.

Surveys of the graduates of the last semesters (SoSe 21 / WiSe 20/21 / SoSe 20) of the program confirm the high relevance of the education at the mentioned interfaces:

- 71.6% / 80.0% / 68.8% of the respective graduates surveyed were able to sign their first employment contract after graduation no later than 3 months after graduation, 38.8% / - / 25% even before graduation.
- 90.1 % / k. A. / 87.5 % indicated in the surveys that they would make the decision to study the Master in Management and Technology program again
- Of the graduates from the summer semester 2021, 86.0% also stated that they would work in an internationally oriented company after graduation. 67.3% of respondents confirmed that they would work for a company with more than 500 employees.
- Of the same respondents, 74.0% agreed (strongly) that they would like to work at the intersection of business and the technologies or sciences after graduation
- Again, 90.0% confirm that their current job matches the training they have received.

According to the surveys, graduates are primarily employed in consulting, project management or IT.

Finally, the high relevance can also be drawn from relevant rankings and comparisons with other study programs of this kind:

In the annual QS Management Masters Ranking from 2021, the Master in Management and Technology program reached 23rd place in an international comparison, where universities, faculties/schools and their programs are evaluated according to five different criteria: Employability, Entrepreneurship and Alumni Success, Return on Investment, Thought Leadership and Class & Faculty Diversity. In the Employability\(^3\) category, the program achieved a score of 80.4 out of 100, placing it

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3 The category is based on a survey of employers in each industry asking which universities they prefer to hire graduates from.

TUM School of Management
08.02.2023
in 13th place out of all 150+ programs compared - far ahead of all other German management programs.\(^4\)

The labor market relevance of graduates of the Master’s program in Management and Technology is therefore to be assessed as very high and will continue to increase due to the ever-increasing challenges (mobility, demographic change, digitalization, etc.) at the interfaces between the disciplines. By imparting advanced management skills, a wide range of specialization options in economics, technology and science, experience in dealing with other (subject) cultures and the explicit promotion of English language skills, graduates of the degree program are prepared for work in companies of different sizes, market orientation and industries. We expect to be able to contribute to the competitiveness of Munich / Bavaria / Germany as a business location by inspiring talented people around the world for the location and giving local companies the opportunity to inspire them to become involved. This capability is a key factor in successful economic and innovation systems.

5 Competitor analysis

5.1 External competitor analysis

For reasons of comparability, only courses of study at universities with a Master of Science (M.Sc.) degree are considered in the following analysis.

<table>
<thead>
<tr>
<th>Degree</th>
<th>University</th>
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<tbody>
<tr>
<td>Betriebswirtschaftslehre – Energy and Finance</td>
<td>Universität Duisburg-Essen</td>
</tr>
<tr>
<td>BWL techn. (Technisch orientierte Betriebswirtschaftslehre)</td>
<td>Universität Stuttgart</td>
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<td>Technische Betriebswirtschaftslehre</td>
<td>Universität Clausthal</td>
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<td>Wirtschaftsingenieurwesen</td>
<td>Universität Paderborn</td>
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<td>Betriebswirtschaftslehre mit technischer Qualifikation</td>
<td>Universität Kaiserslautern</td>
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<tr>
<td>Master in Management and Digital Technologies</td>
<td>Ludwig-Maximilians-Universität München</td>
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<td>Wirtschaftsingenieurwesen</td>
<td>FAU Erlangen</td>
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<tr>
<td>Management &amp; Engineering in Technology, Innovation, Marketing &amp; Entrepreneurship</td>
<td>RWTH Aachen</td>
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<td>Wirtschaftsingenieurwesen</td>
<td>KIT</td>
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<tr>
<td>Technologie-orientiertes Management (Master)</td>
<td>TU Braunschweig</td>
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<td>Wirtschaftsingenieurwesen</td>
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<td>Wirtschaftsingenieurwesen</td>
<td>TU Darmstadt</td>
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<td>Master Management, Technologie und Ökonomie</td>
<td>ETH Zürich</td>
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<td>Management, Technology and Entrepreneurship</td>
<td>EPFL (Lausanne)</td>
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<tr>
<td>Industrial Engineering &amp; Management</td>
<td>DTU (Technische Universität Dänemark)</td>
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Table 1: External competitors of the Master in Management and Technology

Many master's programs are offered in Germany, which focus on training at the interface between technology and management. However, these Master's programs are mainly those that focus on engineering/science education and require a Bachelor's degree, e.g. in Industrial Engineering or Business Informatics. These courses of study often allow students to choose their field of study, e.g. at the Friedrich-Alexander-University Erlangen-Nuremberg (FAU) the choice between mechanical engineering or electrical engineering. The M. Sc. Industrial Engineering at Karlsruhe Institute of Technology (KIT) is a consecutive degree program that requires a Bachelor's degree in the same or a related subject. It is characterized by the choice of subjects and areas within business administration, economics, engineering, computer science and operations research. However, the compulsory elective area with 18 CPs only makes up a small part of the degree program. The Master in Management and Digital Technologies at Ludwig-Maximilians-University München, which was introduced in October 2021, is located at the interface of management, digital technologies and computer science.
The Master’s in Management and Technology is also unique in Europe. There is no comparable degree program with similar choice and diversity of profiles in Europe. Similar, noteworthy programs at the European level are, for example, the Master in Management, Technology and Economics at ETH Zurich (Switzerland), the Master in Management, Technology and Entrepreneurship at École Polytechnique Fédérale de Lausanne (Switzerland) and the Master in Industrial Engineering & Management at DTU (Denmark).

In addition to the broad range of subjects offered by the TUM School of Management, students in the Management and Technology program can also choose from a wide range of subjects offered by various schools at TUM, including Chemistry, Electrical and Information Engineering, Informatics, Mechanical Engineering, Computer Engineering, Industrial Engineering and Sustainable Energies. The well-founded business education is combined with a variety of engineering and scientific specializations and thus forms the unique selling point of the Management and Technology program. Furthermore, the Master's program in Management and Technology differs from the above-mentioned programs in that it offers a very large number of elective modules. This allows students to develop and sharpen their own individual profile.

5.2 Internal competitor analysis

At the other schools of the Technical University of Munich, no Master's program directly comparable to the Master's in Management and Technology is offered.

The fact that a large number of current applicants for the Master's in Management and Technology comes from the Bachelor's in Management and Technology indicates that the Master's program offered is very attractive for consecutive study and that there are hardly any internal alternatives. The TUM School of Management also offers the Bachelor in Management and Technology with a specialization in digital technologies and the Bachelor in Sustainable Management and Technology at the Heilbronn and Straubing campuses. These two degree programs differ not only in their location, but also in the engineering and natural science focus specified in each case.

The other master's programs offered by TUM School of Management differ greatly from the Master's in Management and Technology in terms of the target group and the content-related focus topics such as consumer science, innovations or finance & information management. The applicant groups can be clearly separated due to the different admission requirements.

Outside the TUM School of Management, there are two Bachelor's/Master's programs that also focus on training at the interface between business and engineering or natural sciences. These are the Bachelor's/Master's degree program in Information Systems (Business Information Systems) offered by the TUM School of Computation, Information and Technology (Business Information Systems program with a good 20% share of economics) and the Master's degree program in Development, Production and Management in Mechanical Engineering offered by the former Faculty of Mechanical Engineering, now part of the TUM School of Engineering and Design (Mechanical Engineering program with a purely economic teaching share of approx. 10%).

Both study program concepts emphasize the engineering and natural science courses, while the business education is offered as a supplement. Against this background, the listed degree programs will generally appeal to applicants with a technical interest, while those interested in the Master in Management and Technology will apply with a focus on economic topics and the intention to build up basic know-how in an engineering or natural science subject with a view to their future careers.
or to further expand this knowledge by choosing the major. Due to the different focus, no cannibali-
zation effects within TUM are to be expected.
6 Structure of the degree program

The Master's degree program in Management and Technology comprises a standard period of study of four semesters. The knowledge, skills and competencies specified in the qualification profile are taught in four blocks as described below: Specialization in Management or alternatively elective modules in Management (30 CP; green), technology specialization (30 CP), electives in management and/or technology (30 CP), and the Master's thesis (30 CP), as shown in Figure 3.

![Figure 3: Structure Master in Management and Technology](image)

**Specialization in Management / Electives in Management**

In the area of the management specialization ("Specialization in Management") or alternatively the elective modules in management, students can choose modules from the following disciplinary competence and interdisciplinary focus areas:

- Innovation & Entrepreneurship
- Management & Marketing
- Operations & Supply Chain Management
- Finance & Accounting
- Economics & Econometrics
- Energy Markets
- Life Sciences Management & Policy

Students also have the option of choosing 30 CP from all the management modules offered, without having to commit to a specialization.

In the elective modules, which have seminar or lecture character, technical knowledge and methodological competencies of the respective subject area, which the students already know fundamentally from their management, economics Bachelor's degree program, are trained and deepened. All students are required to complete at least one module worth 6 CP as an "Advanced Seminar". If students have chosen a management specialization, this Advanced Seminar must be taken in the specialization; if not, the Advanced Seminar can be taken in any area. This ensures that all students acquire advanced skills in academic work. Under the guidance of a lecturer, students work on a topic independently, using their skills in literature research, relevant methodology and analysis, among
other things. The examination of the learning content usually takes the form of seminar papers and/or presentations and discussions. Taking this module is recommended in terms of preparation for the master’s thesis after the other courses.

**Specialization in Technology**

In the area of the technology specialization, there are different options depending on the students’ prior knowledge in the area of engineering and natural sciences. Students who have already completed a bachelor's degree program at the interface between management and technology have the opportunity to further deepen the focus they have already studied in their bachelor's degree program. For this purpose, the following concentrations are available, which require prior knowledge usually amounting to 42 CP in subject-specific modules:

- Mechanical engineering „major“
- Chemistry „major“
- Electrical Engineering and Information Technology „major“
- Power Engineering „major“
- Informatics „major“
- Computer Engineering „major“

The above-mentioned "majors" each consist of 30 CP elective modules and thus allow an individual continuation of the technology specialization tailored to the student's own prior knowledge. The students complete the same lectures, exercises and practical courses that are offered in the undergraduate and consecutive programs of the respective schools of TUM. In this way, students become familiar with the vocabulary, ways of thinking and solution approaches of the respective discipline and are able to use them themselves. In this way, students in the Master's program in Management and Technology not only strengthen their skills and social competencies in dealing with specialists from the chosen engineering or natural science field, but also deepen their specialist knowledge in the chosen field.

Students who have not acquired knowledge in the field of science or engineering in their bachelor's degree program, or students who wish to acquire competencies in a new engineering or science field, have the following elective options:

- Mechanical Engineering „minor“
- Chemistry „minor“
- Electrical Engineering and Information Technology „minor“
- Informatics „minor“
- Computer Engineering „minor“
- Industrial Engineering „minor“
- Sustainable Energies „minor“

The named "minor" specializations consist of 30 CP elective modules. The students acquire fundamental basic knowledge in one of the six offered engineering or natural science specializations. In order to ensure the connectivity of the knowledge as well as the understanding of the respective
technical language, it may be necessary in some specializations to complete basic compulsory modules of up to 18 CP at the beginning. This currently applies to the Chemistry Minor (18 CP) and to the Sustainable Energies Minor (12 CP). Once again, these are the original lectures, exercises and practical courses offered to students of the respective subject in the undergraduate engineering or natural sciences programs. Since the students learn these basics together with the students of the undergraduate program, they simultaneously get involved in a completely different communication and solution culture in their respective engineering or natural science focus. In a generic sense, the engineering or natural science focus fulfills the function of ensuring that graduates of the Management and Technology program can communicate with representatives of the respective engineering or natural science discipline about its contents.

Electives in management and/or technology / mobility window

In the area of the electives in management and technology, which is also a mobility window in the third semester, students have the opportunity to deepen existing knowledge according to their own inclination, to acquire new knowledge in order to expand their own competencies, or to transfer theoretical knowledge into practice in the form of a project study. The following options for the electives in management and/or technology are considered to be ideal:

(1) Use to elect additional modules as part of the management specialization or the elective management area (if no specialization is chosen). This option offers the possibility of profiling in competition with special master programs in economics.

(2) Use to select further modules of the technology specialization at basic or advanced level. This option offers the possibility of sharpening the profile in competition with classical industrial engineers and industrial engineers, who normally have more technical components in their studies.

(3) Use in freely selectable proportions both for modules from the management and technology area. In this way, students broaden their knowledge of the interface between management and technology according to their interests and, for example, examine it from the perspectives of different disciplines.

(4) The student can spend a semester at a foreign university in the sense of a mobility window. The freedom of choice simplifies the recognition process for modules taken abroad. This option increases the attractiveness of a stay abroad for the purpose of sharpening an international profile as well as for acquiring knowledge in subject areas that are not primarily pursued at TUM. Such a study period abroad also intensively sensitizes students to intercultural issues and prepares them for working in international teams.

As part of the electives in management and/or technology, a project study of 12 CP can be chosen. The project study creates the opportunity to transfer theoretical knowledge into practice in engineering and science-related companies. This promotes analytical and solution-oriented thinking and acting. At the same time, social skills are acquired, such as the ability to work in a team, since the project studies are completed in a group of at least two students.

The 30 CP in the area of the electives in management and/or technology are designed as elective modules in the sense of freedom of choice and own profile formation and can have all common course formats.
**Master’s thesis**

The Master’s program is completed in the fourth semester by the Master’s thesis, which must be completed within six months. In this thesis, students deal scientifically with a specific topic in economics, engineering or science. To this end, students formulate in writing the state of scientific knowledge and discourse and develop a specific question based on this. The students deal with the topic using the subject and methodological knowledge acquired in the course of their studies, applying the scientific facts and methods acquired in the course of their studies, and develop an independent solution to the problem. Based on scientific research, they present facts and findings in writing, evaluate them and place the results obtained in the scientific and/or practical discussion. This enables students to work on a project independently, systematically and scientifically and to develop a solution independently. The students work on the topic on their own, supported by feedback discussions with a supervising professor. The Master’s Thesis can be issued and supervised by qualified examiners of the TUM School of Management of the Technical University of Munich as well as by qualified examiners of other schools teaching in the study program Management and Technology. Master’s theses in cooperation with companies are generally possible. The content of the thesis is designed to be completed within a period of six months.

Since it is the declared goal of the Master’s program in Management and Technology to encourage students to a high degree of self-competence in the area of assuming personal responsibility, this program includes extensive freedom of choice: For example, students are free to choose a specialization in management or not. Should one be chosen, then this can be selected and combined with the technology specialization and the design of the economic-technical elective area, depending on preferences and interests. Apart from the Master’s thesis, which is scheduled for the fourth semester, this also applies to the chronological sequence of the other three content blocks of the program.

Through their individual choice of courses and the option of studying the program up to 100% in English, students also control the extent to which they acquire subject-specific, business-fluent English skills and in which subject areas.

In order to ensure the best possible study options for students despite the wide range of choices, the TUM School of Management has drawn up corresponding study schedules for five exemplary combination options. If this ideal-typical schedule is not feasible for every student, he or she is given the opportunity to make appropriate changes in the elective area by individually adapting his or her study plan in order to be able to acquire the specified 30 CP per semester. For the individual planning of the study plan as well as for the planning of a semester abroad, the International Office and the Program Management offer weekly consultation hours as well as regular information events and
Furthermore, the Buddy Program offers the possibility to be mentored by a student of a higher semester. The Buddy Program is organized by the School Office.

Figure 4: Exemplary study plan with the basic structure of the study program when choosing the specialization in management Innovation & Entrepreneurship and the specialization in technology Sustainable Energies (minor).

### The Double Degree with HEC Paris

Within the framework of the Master Management and Technology, qualified students can obtain a double degree in the Master in Management of the "HEC Paris an établissement d'enseignement supérieur consulaire" (in short: HEC Paris).

Double-degree students who start at TUM complete 30 CP in the first and second semesters in their management specialization and 30 CP in their technology specialization. The study abroad phase at the HEC Paris starts in the winter semester. Until April of the following semester, the students take 40 CP in the specialization of the "Master in Management Grande École M2" (M2 = specialization phase) at HEC Paris. Participation in the "Certificate Program" (15 CP) offered afterwards is optional. A 15-week relevant internship must be completed in the period between the end of the Bachelor's degree and the end of the Master's program. We recommend that this be carried out directly in France following the stay abroad. In the 5th semester, students either write their complete Master's thesis (30 CP) at TUM or start at HEC Paris with a research paper (20 CP) in collaboration with a TUM professor and finish it as a Master's thesis at TUM to receive a total of 30 CP.

Double-degree students starting at HEC Paris complete 60 CP in the "Master in Management Grande École M1" (M1 = general management phase) at HEC Paris in the 1st and 2nd semester as well as a 15-week internship. In the 3rd, 4th and 5th semesters they attend the TUM School of Management and take 30 CP each in their economics concentration or, if no concentration is chosen, the economics elective modules as well as 30 CP in their chosen engineering or natural science concentration. They also write their Master's thesis (30 CP) at the TUM School of Management.
7 Organizational affiliation and responsibilities

Program responsibility and coordination are the responsibility of the Vice Dean of academic and student affairs of the TUM School of Management, who is supported by the School Office. The academic program director is responsible for the program. At the level of the degree program, the Master's Examination Board and the Aptitude Assessment Committee of the TUM School of Management should also be mentioned. The Master's Examination Board of the TUM School of Management is responsible for the clarification of examination-related matters, whereby the recognition of examination achievements can be delegated to those responsible for the modules at the various locations. The Aptitude Assessment Committee is responsible for the proper conduct of the admissions process.

Central administrative tasks are carried out in coordination with the Vice Dean of academic and student affairs, the Program Director and the responsible committees and commissions of the administration of the TUM School of Management, in particular the Divisions Undergraduate and Postgraduate Education, Quality Management and Marketing.

Information about the study program is published on the website of the TUM School of Management (www.mgt.tum.de).

For administrative aspects of the study organization, both the central areas of the TUM Center for Study and Teaching (TUM CST) and institutions of the school are responsible (see following overview):

- **General Study Counseling:**
  
  Central: Study Counseling and information (TUM CST)
  
  E-Mail: studium@tum.de
  
  Phone: +49 (0)89 289 22245
  
  offers information and advice for:
  
  prospective students and enrolled students
  
  (over the Hotline/Service Desk)

- **Subject Academic Counseling:**
  
  TUM School of Management – Program Management
  
  Andreas Bauerfeld,
  
  E-Mail: studentcounseling_master@mgt.tum.de

- **Counseling on study abroad / internationalization:**
  
  Central: TUM Global & Alumni Office
  
  E-Mail: globaloffice@tum.de
  
  Decentral: TUM School of Management – International Office
  
  Gabriella Loparco (Student Exchange Programs: Outgoing – Europe, Freemover, Internships)
  
  E-Mail: outgoing@mgt.tum.de
  
  Phone: +49 (0)89 289 25036
  
  Anna-Lena Köttig (Student Exchange Programs: Outgoing – NON-EU, Summer and Winter Schools)
E-Mail: outgoing@mgt.tum.de  
Phone: +49 (0)89 289 25847

Josephina Buhr (Joint International Programs)  
E-Mail: jip@mgt.tum.de  
Phone: +49 (0)89 289 25079

Zuzana Zechovska  
(Student Exchange Programs: Incoming exchange students)  
E-Mail: incoming@mgt.tum.de  
Phone: +49 (0)89 289 28185

- **Women’s representative:**  
  TUM School of Management  
  Dr. Christian Feilcke  
  E-Mail: office.ent@wi.tum.de  
  Phone: +49 (0)89 289 25706

- **Counseling for barrier-free studies:**  
  Central Service point for disabled and chronically ill students and prospective students (*TUM CST*)  
  E-Mail: Handicap@zv.tum.de  
  Phone: +49 (0)89 289 22737  
  Decentral: TUM School of Management  
  Katja Leßke  
  E-Mail: katja.lesske@tum.de  
  Phone: +49 (0)89 289 25086

- **Application and matriculation:**  
  Central: application and matriculation  
  (*TUM CST*)  
  E-Mail: studium@tum.de  
  Phone: +49 (0)89 289 22245  
  Application, matriculation,  
  Student Card, leave of absence confirmation, exmatriculation

- **Selection procedure:**  
  Central: Application and matriculation (*TUM CST*)  
  Decentral: TUM School of Management Admissions  
  Silvana Rueda Urrea  
  E-Mail: admission@mgt.tum.de  
  Phone: +49 (0)89 289 25543

- **Tuition and scholarships:**  
  Department of Tuition and Scholarships (*TUM CST*)  
  E-Mail: beitragmanagement@zv.tum.de  
  Scholarships and semester fees

- **Central examination matters:**  
  Department of Central Examination Matters  
  (*TUM CST*), Campus Munich  
  Graduation documents, examination notices, graduation certificates

TUM School of Management  
08.02.2023
• Decentralized examination administration:
  TUM School of Management – Grade Management
  TUM Campus Munich
  E-Mail: grademanagement@mgt.tum.de
  Shan Huang
  Phone: +49 (0)89 289 23884
  Michaela Gerhardt
  Phone: +49 (0)89 289 25086
  Inna Kravchenko
  Phone: +49 (0)89 289 23449
  Janine Rothenburger
  Phone: +49 (0)89 289 25033

• Examination board:
  President: Prof. Dr. Joachim Henkel
  Secretary: Dr. Christian Feilcke

• Quality management study and teaching
  Central: Study and Teaching –
  Quality Management (TUM CST)
  https://www.tum.de/studium/tumcst/teams-cst/
  Decentral: TUM School of Management
  Vice Dean of academic and student affairs:
  Prof. Dr. Jürgen Ernstberger
  QM- Representative: Mattia Marchesini,
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  Phone: +49 (0)89 289 25849
  Coordination Module Management: Sonja Kopf
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  Phone: +49 (0)89 289 25075
8 Developments in the degree program

The master's program in Management and Technology was introduced in the winter semester 2017/18. It builds on the two predecessor courses Technology and Management-oriented Business Administration and Business with Technology. The Master in Technology and Management-Oriented Business Administration was established in 2008 and the Master in Business with Technology in 2011 in response to the demand for well-trained graduates who are able to master the increasingly complex tasks at the interface between technical/scientific and commercial business areas. With the introduction of the Masters in Management and Technology, the previous target groups of the two courses were brought together: Bachelor graduates of the TUM-BWL Bachelor’s degree program or of a comparable first degree program at the interface of management and technology, as well as graduates of a first degree program in economics with an affinity for technology. In this way, synergy effects were exploited in the field of economics of the two study programs and external communication was simplified.

With the redesign of the program, the Master's degree in Management and Technology can now be studied in English, making it more attractive to both national and international students. A high degree of individual choice and specialization options as well as a mobility window have given students the opportunity to identify and develop their talents, strengths and abilities and to sharpen their personal professional profile. The wide range of options and specializations in the fields of management and technology create the option of profiling both in competition with special master's programs in economics and with traditional industrial engineering programs.

Based on the experience and evaluation in the qualification procedure of the first Intake, this was adjusted in 2018. The changes in the area of qualification requirements led to a more targeted and tailored selection of applicants for the program. Furthermore, the introduction of the essay as part of the selection process has resulted in faster processing of applications. To ensure the acquisition of intercultural competencies and internationality for all students, the mandatory module Advanced International Experience was introduced in 2018 (mandatory module from 2018 to 2022).

In terms of content, a new, English-language engineering focus has been designed for the cohorts from winter semester 2023/24 with the minor in "Sustainable Energies", which takes even better account of the current needs and requirements of the job market for graduates. Students on the course are to be given the opportunity to learn the basic principles and challenges of renewable energies and to understand their ecological, economic and social effects so that they can make their own contribution to their further development as graduates at the interface with economics. Three English-language technology specializations are now offered as part of the degree course, which can also be studied without prior knowledge. The introduction of the new specialization strengthens the international profile of the Master's degree.