

Degree Program Documentation Master's Program Management and Digital Technology

Part A

TUM School of Management

Technical University of Munich

General Information:

- Administrative responsibility: TUM School of Management
- Name of degree program: Management and Digital Technology
- Degree: Master of Science (M.Sc.)
- Standard duration of study and credits:
4 semesters of enrollment and 120 credit points
(CP)
- Form of study: Full-time, on-campus degree program
- Admission: Aptitude assessment (EV)
- Start: Summer semester (SoSe) 2024
- Language of Instruction: English
- Main Location: Heilbronn
- Academic administrator (program design):
Academic Program Director,
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- Contact for further questions (regarding this document):
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1 Degree Program Objectives

1.1 Purpose of the Study Program

Challenges/Status Quo

The Master in Management and Digital Technology (MMDT) aims to prepare graduates for the future challenges of progressive digitization in companies, focusing on family firms and small and medium-sized enterprises (SMEs). Digitization and the increasing influence of new technologies such as Blockchain, Applied AI, Cloud Computing, and Industry 4.0 on corporate activities promise many possibilities, but only if the major challenges these new technologies impose are met. SMEs and family firms often do not have the same means to respond to these challenges compared to large multinational firms with more resources to invest in and leverage digital technologies. As the complexity of these new technologies increases, and the innovation and research and development cycles become shorter, firms lack employees with proper digital skills who can easily adjust to and implement these technologies. Particularly at the interface between management and digital technology, communication barriers repeatedly arise in practice due to a lack of specialist knowledge of the other subject areas, respectively. In addition, due to limited resources, small and mid-sized companies frequently lack experts that drive the efficient development and proper adoption of new tools and processes. Budget concerns, security concerns, and the cultural mindset of holding on to traditions and resistance to change are especially prevalent in small and mid-sized companies. As family firms and SMEs usually do not have the resources to correct or compensate for sub-optimal decisions or, in general, lack a digital enterprise strategy, digital initiatives in these companies are even more likely to fail.

Contribution of Program to Address Challenges

The Master in Management and Digital Technology addresses these challenges and thus plays an important role in supporting firms, particularly small and medium-sized companies and family businesses, to compete successfully within a globally competitive environment. The program untangles the complexity of new and innovative tools through in-depth and targeted training in these technologies as well as effective change management strategies. Management and leadership skills, including interdisciplinary thinking to recognize interrelationships and to effectively serve as a liaison between diverse stakeholders, are essential in addressing the above-mentioned challenges. This also includes developing management competencies to introduce digital technologies on a larger scale within the company. Training in business analytics will assist with adequately analyzing, implementing, and using data. As more and more data is available in the context of the digitization of processes, these competencies become an essential part of the program.

Role of Graduates in Problem Solving

Graduates of the program can implement and optimize the use of digital technologies in their companies. As technically skilled employees who are productive and proficient with digital technologies in combination with in-depth knowledge of business administration, they evaluate the value of these new processes, can assess the impact of the new technologies on business models and business processes across all functional areas of the company, and can determine root causes of issues through data analytics. In addition, the management and leadership skills

they gained will allow them to effectively manage and build relationships with all stakeholders and employees involved in order to make well-founded decisions. Thus, graduates will have the unique competitive advantage of "speaking both languages"—having the capability to communicate complex technologies in a meaningful manner to a variety of audiences through their ability of understanding and navigating the interrelationships. With their profound skills focused on solving the challenges associated with digital technologies in small and medium-sized enterprises, graduates of the program will play an essential part in the digital business models and strategies of firms.

1.2 Strategic Significance

The program portfolio of the TUM School of Management includes bachelor's, master's, and continuing education programs. The task of study and further education as well as the idea of lifelong learning, which is anchored in the Bavarian Higher Education Act, is implemented with this program portfolio.

One of the strategic goals of the TUM School of Management is to impart 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 to further 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 programs of the TUM School of Management, which can be divided into three categories according to their content:

(1) Interdisciplinary management programs with a focus on engineering, natural, and life sciences: These include the bachelor's program in Management and Technology at the TUM Campus Munich and the TUM Campus Heilbronn, as well as the Master in Management and Technology (MMT) in Munich, the Master in Consumer Science, the Master in Finance and Information Management, and the bachelor's and Master in Sustainable Management and Technology at the campus in Straubing.

(2) Programs that provide basic management training for students with a technical or scientific first degree: The Master in Management at the TUM Campus Munich and TUM Campus Heilbronn fall into this category.

(3) Programs in Continuing Education: In the part-time Executive MBA programs for experienced professionals with management responsibilities, participants are trained to become effective and responsible managers by broadening their knowledge, expanding their competencies, and developing their personalities. The continuing education Master in

Management & Innovation at the TUM Campus Munich and at the TUM Campus Heilbronn expand the portfolio of programs with the target group of young professionals with initial work experience and (yet) no management experience.

The program portfolio of the TUM School of Management is captured in Figure 1.

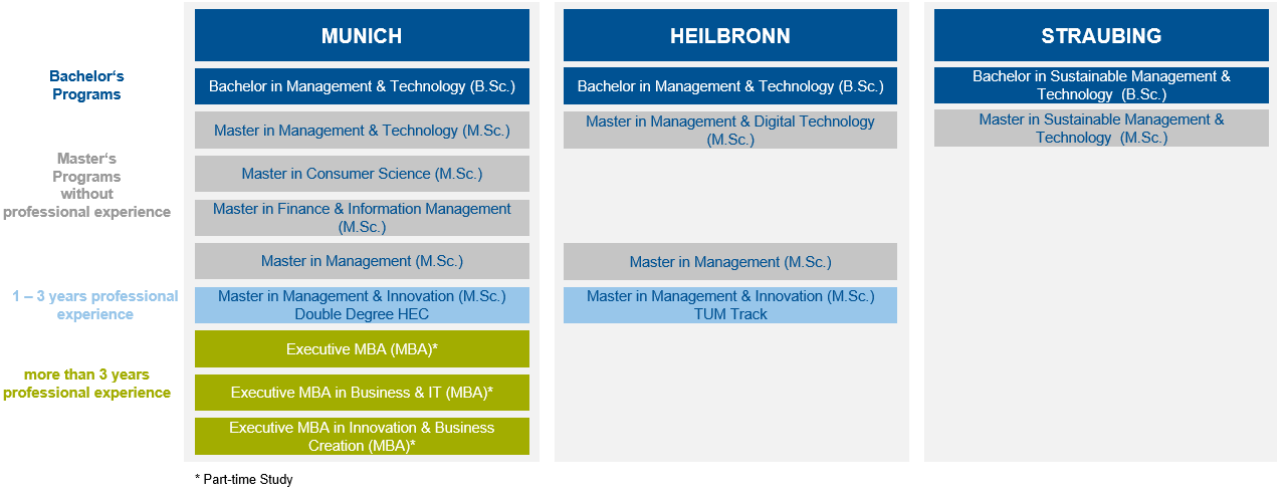


Figure 1: Program portfolio of the TUM School of Management at the university locations in Munich, Heilbronn and Straubing: Bachelor's programs (dark blue), master's programs without work experience (gray), continuing education programs with work experience (light blue), MBAs with work experience (green).

Students of the Master in Management and Digital Technology can deepen their knowledge (from the previous bachelor's program) in different domains during their studies. In doing so, they can sharpen their profile to match their intended career goals. At TUM Campus Heilbronn, the bachelor's degree program "Management and Technology" with a specialization in "Digital Technologies" has been offered since the winter semester 2019/20. The Master in Management and Digital Technology can be studied consecutively and complements the range of courses offered by the TUM School of Management with a master's-level course that addresses the combination of management and digital technologies. Thus, the consecutive program develops TUM Campus Heilbronn into a location where students can complete their entire management and technology degree program.

The program supports the TUM School of Management's mission to be a driver of innovation for the economy. The focus on in-depth training in innovative and impactful technologies results in skilled graduates contributing to a digitally savvy society. The Master in Management and Digital Technology expands the TUM School of Management's portfolio by focusing on small and mid-sized companies, thus, advancing these companies to be economic players in a competitive environment. With this and its English-language and interdisciplinary courses, the program not only fits into the overall strategy of the TUM School of Management but also enhances it with its unique focus.

2 Qualification Profile

The standard duration of the Master in Management and Digital Technology 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) at TUM Campus Munich or Management and Technology at TUM Campus Heilbronn, following a primarily business-oriented bachelor's degree program or following a bachelor's degree program 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, on the basic knowledge and competencies already acquired in the technology focus.

Graduates of the Master in Management and Digital Technology possess enhanced and deepened professional and methodological competencies in theory and practice in specialist areas of family enterprises and digital enterprises.

Students who do not choose an explicit specialization will strengthen their cross-disciplinary subject and methodological skills between the two areas. In doing so, they can apply and further develop concepts in related fields relevant to business economists, such as economics, law, and the interrelationships with business administration.

Graduates of the Master in Management and Digital Technology possess in-depth professional knowledge and advanced methodological skills in theory and practice in areas such as management of innovation, management of digital businesses, and driving digital enterprise strategies.

The competencies taught in the Master in Management and Digital Technology are described in detail in chapters 2.1 to 2.4 in compliance with the German Rectors' Conference's qualification framework.

2.1 Knowledge and Understanding

Graduates of the Master in Management and Digital Technology will either (1) deepen their management knowledge in the area of Family Enterprise or Digital Enterprises, or they will (2) acquire management competencies across both areas. In addition, the graduates can apply advanced knowledge of data science, statistics, and business analytics. They are able to implement empirical and analytical methods successfully, combine them with entrepreneurial questions, and can therefore analyze complex business and management problems with analytical and quantitative methods.

Mastery of both qualitative and quantitative methods of analysis allows them to identify business and management problems and develop approaches to solve them. Basic concepts and methods of economics and law are known and can be linked to management issues, particularly in digital businesses. Thus, the graduates are particularly well suited to recognize problems at the interface between management and digital technologies.

2.2 Use, Application, and Generation of Knowledge

Graduates are able to apply and successfully use the specialized knowledge and methodological and problem-solving skills they have acquired in a business context and at the interface between digital technologies and management. They use their acquired knowledge to solve complex problems and tasks in digital and traditional businesses. Research and methodological competencies are deeply anchored and retrievable. Graduates are able to identify and formulate current research questions in detail. They can create and implement a corresponding research design based on these questions, which may need to be proven empirically. They are able to evaluate the resulting findings according to the latest state of research and produce usable results. Graduates can serve as technology leaders and manage or drive digital strategies in companies. They always critically question their partial results as well as the final result and can subsequently present and communicate both orally and in writing.

Graduates are capable of analyzing real problems from business administration or problems interfacing with business administration, management, and digital technology. They are able to research the according information independently, identify possible solutions to complex problems and can structure and present them.

2.3 Communication and Cooperation

Graduates can effectively and efficiently communicate complex digital technology concepts within the business context. They can adjust their communication style to reach all stakeholders.

Graduates of the Master in Management and Digital Technology speak both languages, that of management and that of the technical departments in companies, and can thus act as mediators. They are able to bring the experts from management and from the technical departments to the same table in order to persuade them to work together sensibly and to find efficient solutions in the interests of the company, despite often differing approaches and divergent communication cultures. Challenges and potential conflicts can be identified at an early stage, particularly by specialists who can reflect on a problem from a management and technology perspective. They manage to make both groups feel understood and represented in order for them to work together effectively and to find the best solutions. Thus, graduates are able to conceptualize how to successfully work together on problems in international and interdisciplinary teams and how to successfully communicate results and solutions for complex issues (also in an international context).

Graduates of the Master in Management and Digital Technology are fluent in written and spoken Business English and have in-depth intercultural skills that they can use confidently and skillfully in companies that are operating internationally.

2.4 Scientific Self-Conception

Graduates of the Master in Management and Digital Technology display a professional attitude. They can critically question existing circumstances or, broken down to the operational level, existing workflows in companies and organizations. They are guided by ethical and moral

values and responsibly perform all assigned tasks. With the skills they have acquired, graduates reflect on their familiar environment and question as well as critically evaluate it. They are able to place social and corporate expectations in an ethical context.

3 Target Groups

3.1 Target Audience

The target group of the master's program in Management and Digital Technology is graduates of the bachelor's program in Management and Technology, of a comparable national and international first-degree program at the interface of economics, management, and engineering/informatics/natural sciences, or of a first-degree program in economics with a high affinity for digital technology. 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 in Management and Technology in Munich 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. The master's is attractive to applicants as it allows them to further their knowledge and skills in a consecutive program. As the degree is fully taught in English, it is interesting for national as well as international prospective students.

3.2 Prerequisites

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 used in business administration to complete the degree program successfully. Prerequisites are in-depth knowledge of business administration, statistics/ empirical research methods, and mathematics. In addition, applicants need to have basic programming skills. 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, competence in scientific work, and clear and concise reasoning skills are also required. The eligibility procedure is regulated in detail in the program statutes and set out in detail. After evaluation in the first stage, applicants are either admitted immediately, or rejected, or their essay submitted with the application is used for assessment, depending on the score achieved.

The Master in Management and Digital Technology is offered in English. Therefore, very good English skills are a prerequisite for a successful application. These are already checked upon receipt of the application through language certificates.

3.3 Target Numbers

The planned target size of students in the cohort of the Master in Management and Digital Technology at TUM Campus Heilbronn is 80 students.

Currently, the TUM School of Management educates approximately 39% of its students at the bachelor's level and 55% of its students at the master's level, as well as 6% of its students in Executive Education (as of October 2021).

Since the program is considered a consecutive program of the bachelor's in Management and Technology at the TUM Heilbronn Campus, a look at the bachelor's student numbers will provide some insights into the prognosis of expected applications for the Master in Management and Digital Technology.

From the start of the bachelor's in Management and Technology in 2019, the number of applicants increased from 210 in 2019, 403 in 2020, to 612 in 2021. The acceptance rate was 53% in 2019 and 45% in 2021. This speaks for the attractiveness of the bachelor's program, its specification, and the campus Heilbronn. It is expected that this will also be the case for the MMDT.

4 Demand Analysis

As digitization continues to advance and innovation cycles shorten, the need for experts in digital technologies is expected to increase. There is a need for managers across the various functional areas of companies (e.g., production, logistics, marketing, controlling, etc.). Setting up one's own company or working in a consulting firm are also possible areas of activity in which interface competence in the field of management and digital technologies are in demand. Graduates of the Master in Management and Digital Technology can therefore expect excellent career prospects. In addition, they can contribute to solving social and economic problems associated with technological illiteracy in digital contexts.

The need for employees skilled in digital technologies is confirmed by several studies. A survey on digitization published by the Chamber of Industry and Commerce in January 2021 highlights, "The skills and digital know-how of employees and managers are very important for the digitization processes in companies." Regarding which digital know-how needs to be developed among employers and managers, the ability to handle digital technologies was stated as the competency needed the most focus to ready a company to deal with future challenges and demands (with 68%).¹ Another study among companies by the Chamber of Industry and Commerce in the Region Heilbronn-Franken revealed that digitization has priority for 82% of the companies. For 97%, the highest need for further education in advancing digital skills exists in the field of Artificial Intelligence. The results of the study also highlight that the key areas of *employees* (79%) and *processes and organization* (68%) need the most development to prepare corporations for digital business models. The majority of the companies plan the implementation or further development of new technologies such as Industry 4.0 (49%), Artificial Intelligence (32%), and Big Data Applications (62%).² As these are the digital technologies graduates of the Master in Management and Digital Technologies will be trained to become experts of, they can meet the demands of these companies and contribute to their digital initiatives and strategies.

A study conducted by the Economist Intelligence Unit demonstrates the need for digitally skilled graduates on an international level. Respondents representing a variety of sectors in nine countries responded to questions surrounding IT's changing mandate. When asked what categories of technology will be the most important to the success of an organization over the next 12 months, the respondents stated that Cloud Computing, AI and Machine Learning, Data Science and Analytics were the top three. 71% of respondents reported that relatively few of

¹ Deutsche Industrie und Handelskammer e. V. (Januar 2021) Digitalisierung mit Herausforderungen, Die IHK-Umfrage zur Digitalisierung [online] (<https://www.dihk.de/resource/blob/35410/e090dfd44f3ced7d374ac3e17ae2599/ihk-digitalisierungsumfrage-2021-data.pdf>) [abgerufen am 25.08.2022]

² Francas, David, Herion Lena, Schweiker Peter (Januar 2022) Studie zur Digitalisierung von Wertschöpfungsketten in der Region Heilbronn- Franken [online] (<https://docplayer.org/183465578-Studie-zur-digitalisierung-von-wertschoepfungsketten-in-der-region-heilbronn-franken-prof-dr-david-francas-lena-herion-peter-schweiker.html>) [abgerufen am 25.08.2022]

their applicants currently have AI and/or machine learning capabilities.³ Graduates of the Master in Management and Digital Technology with extensive knowledge in these areas can fill this gap.

With advanced management skills, specialization options, and the promotion of English language skills, graduates of this degree program are prepared for jobs in national and international companies of different sizes, market orientations, and industries. We expect this degree program to contribute to the competitiveness of Heilbronn as a business location. As the degree program will inspire global talent to work here, local companies will have the opportunity to inspire them to work here.

³ Watson M., Yalavac S., Soule J, Ross, C, Talboom-Kamp, E. Bunyan, D. (2021) [online] (https://impact.economist.com/perspectives/sites/default/files/itschangingmandate_final.pdf [abgerufen am 25.08.202]

5 Competition Analysis

5.1 External Competition Analysis

To ensure comparability, only universities with a Master of Science (M.Sc.) degree were considered in the following analysis.

Domestic Competition

In Germany, many master's degree programs focus on training at the interface between technology and management, especially Industrial Management. However, only a few include a focus on digital technologies. For the purpose of feasibility and a targeted competition analysis, we are concentrating on the four domestic programs which explicitly offer a digital technology focus (see table below). Of these four programs, only RWTH Aachen offers a specialization in digital technologies. Compared to the Master in Management and Digital Technology in Heilbronn, the RWTH has relatively little emphasis on digital technology, with 10-15 ECTS for the specialization in digital technology. The TU Braunschweig does not offer any specializations and its master's program focuses on informatics without a particular coverage of digital technologies. The Ludwig-Maximilians-University addresses digital technologies in its master's program. However, it does not offer specializations in digital enterprises or business analytics. What makes the Master in Management and Digital Technology stand out compared to all other domestic master's programs is the extent of the specializations on digital technologies, data-driven decision-making, and family enterprises. With this program, the TUM School of Management will fill the gap and offer students the highly demanded digital technology focus as described in Chapter 4.

Table 1: List of master's programs with a digital technology focus offered by domestic universities

Master with Digital Technology	University
Betriebswirtschaftslehre mit technischer Qualifikation	Universität Kaiserslautern
Master in Management and Digital Technologies	Ludwig-Maximilians-Universität München
Management & Engineering in Technology, Innovation, Marketing & Entrepreneurship	RWTH Aachen
Technologie-orientiertes Management (Master)	TU Braunschweig

5.2 International Competition

The international competition for a Master in Management and Digital Technology is still limited. According to Financial Times rankings of the Top Master in Management Programs (2021), only 15 universities on that list offer similar or comparable master's programs which

incorporate management and digital technology (s. table below). The TUM School of Management with the Master in Management and Technology ranks 49th among the top international master's programs. Although some international competitors offer similar programs focusing on digitalization, digital technologies, and other technology trends, the number of direct competitors drops even lower when the Master in Management and Digital Technology specializations are considered. Some of these business schools offer comparable programs on the technology and engineering side but lack the management focus, while other universities focus more on business administration. Further analysis with respect to the family enterprise specialization reveals that no other master's program on the Financial Times list offers a comparable package. Thus, the MMDT would also add to the competitiveness of the Technical University of Munich at an international level.

Table 2: List of international universities and their master's programs related to digital technologies⁴

FT Ranking	University	Country	Master with Digital Technology
3	University College Dublin: Smurfit	Ireland	M.Sc. in Digital Innovation
13	IE Business School	Spain	Master In Digital Business & Innovation
15	Warwick Business School	UK	M.Sc. Management of Information Systems & Digital Innovation
16	Esade Business School	Spain	M.Sc. in Digital Business
34	IESEG School of Management	France	Master in Strategy and Digital Transformation
37	Maastricht University School of Business and Economics	Netherlands	Digital Business and Economics
56	MBS (Montpellier Business School)	France	M.Sc. Digital Transformation & Business Consulting
60	ICN Business School	France	M.Sc. in Digital management
63	TBS Education	France	M.Sc. Digital Transformation & Business Innovation
63	Burgundy School of Business	France	M.Sc. Artificial Intelligence & Digital Technology Management
70	Institut Mines-Télécom Business School	France	M.Sc. Management of Innovation in the Digital Economy
79	Lancaster University Management School	UK	Digital Business, Innovation and Management
85	Politecnico di Milano School of Management	Italy	IMDT – International Master in Digital Innovation and New Business Design
92	Jonkoping International Business School	Sweden	Digital Business
99	DCU Business School	Ireland	M.Sc. Global Management (Digital Disruption)

⁴ Financial Times (2021) Business School Rankings [online] <https://rankings.ft.com/rankings/5/masters-in-management-2021> [accessed 25.08.2022].

5.3 Internal Competition Analysis

At other faculties and schools of the Technical University of Munich, no master's program is directly comparable to the Master in Management and Digital Technology in Heilbronn. The Master in Management and Technology at TUM Campus Munich shares the combination of Management and Technology, but it differs in the management as well as the technology specializations. Further, the location of the program at the campus in Heilbronn, with its specialization in family enterprises, adds a unique competitiveness compared to other TUM programs.

The Master in Management and Digital Technology is a very attractive consecutive study program for graduates of the Bachelor in Management and Technology (BMT) in Heilbronn. The steadily increasing student demand for the BMT HN with a focus on "Digital Technologies", which was launched for the first time in the winter semester 2019/20, reflects the attractiveness of the combination of management and digital technologies. At the start of the program in the winter semester 2019/20, 210 applications were recorded, which almost doubled in the following year (403 applications) and finally increased further to 602 applications in the last application phase for the winter semester 2021/22. With this high demand for BMT and the students requesting a consecutive program in Heilbronn, there are hardly any internal alternatives.

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

6 Program Structure

The Master in Management and Digital Technology comprises a standard period of study of four semesters. The study program usually starts in the winter semester, but by selecting specific electives, enrolling for the summer semester will also be possible. All the modules (including the master's thesis) have a total of 120 ECTS. The knowledge, skills, and competencies specified in the qualification profile are acquired through a combination of methodological, management, and Digital Technology subjects (see table 3).

Table 3: Structure Master in Management and Digital Technology

Methods 12 ECTS
Specialization and/ or Electives in Management 48 ECTS
Specialization in Digital Technology 30 ECTS
Master's Thesis 30 ECTS

Methods

As a foundation for the subsequent modules, the Master in Management and Digital Technology offers one methodological module in the first and one in the second semester. These modules provide knowledge about the necessary tools to finish the succeeding modules successfully. Here the students learn advanced analytical and quantitative or qualitative methods as well as concepts used in management.

This knowledge is central to pursuing the Master in Management and Digital Technology as it provides the students with the knowledge needed for research processes. These methodological courses can include formulating research questions, collecting and analyzing data, and designing research. It can furthermore deepen the understanding of the students regarding writing a research paper or presenting their research progress or findings. For these reasons, the methodological modules are mandatory for all students and specializations.

Digital Technology

The specialization in Digital Technology consists of 30 ECTS of elective modules that students can choose from depending on their prior knowledge of informatics as well as their personal interest. The modules are offered in a seminar, lecture, or exercise format. Students learn how data and adequate analysis methods can be used to design and implement digital business models and processes. As a result of growing digitization, the quantity of data available and its potential value to companies continue to increase. Equipped with these data-centric and analytical skills, students can capture value and facilitate the implementation of new

technologies. They are able to conceptualize analytical processes required to generate value from this data by relying on analytical and statistical methods to address business needs.

Some lectures and exercises are courses offered by the School of Computation, Information and Technology. Here, students can familiarize themselves with the approaches and terminology of the field of Informatics. Therefore, they can strengthen their communication skills with specialists from other disciplines aside from deepening their knowledge in the described area in order to assess a given problem from different perspectives.

Electives in Management

Since it is the declared goal of the master's program in Management and Digital Technology to develop students to a high degree of self-competence in the area of personal responsibility, this program includes extensive elective freedoms: For example, students are free to choose a specialization or not. Should the student decide to choose a specialization, they have to take at least 30 ECTS of the required 42 ECTS of electives in the respective specialization. Should the student decide not to choose a specialization, they can choose modules from all specializations to achieve the 42 ECTS.

The elective modules are provided in a seminar or lecture format. All students are required to complete at least one module worth 6 ECTS as an "Advanced Seminar". Modules in the form of advanced seminars allow the students to deepen their knowledge and to gain practical experience in academic research. Under the instructions of a lecturer, the students learn how to work independently on their own topics. Here, they can gain expertise in conducting a literature review and applying content-relevant methods and analysis. The modules are usually evaluated through research papers, presentations, and/or discussions. Taking at least one "Advanced Seminar" ensures that students are sufficiently prepared to write their master's thesis.

The electives in management also create the option of a mobility window, a semester at a university abroad in the third semester. The freedom of choice regarding the specializations and purely having electives in the third semester simplifies the recognition process for modules taken abroad. This option increases the attractiveness of a stay abroad. Students can sharpen an international profile and acquire knowledge in subject areas not primarily pursued at TUM. Such a period of study abroad also provides students with intensive intercultural awareness and prepares them for working in international teams.

As part of the electives, the module *advanced project studies* (with a total of 12 ECTS) can be chosen. The project study provides the opportunity to transfer theoretical knowledge into practice in management-related companies. This promotes analytical and solution-oriented thinking and acting. At the same time, students acquire social skills, such as the ability to work in a team, since the project studies are completed in groups of at least two students. Due to its flexibility with respect to scheduling, this module can be done directly before or after the time abroad in the same semester.

Specialization in Management

The planned degree program is designed to train students as managers for the conception and implementation of digital technologies in business models and business processes. In doing so, students can act as generalists for management areas and company types or specialize in two different areas:

- 1) Family Enterprise
- 2) Digital Enterprises

Every student has to acquire 12 ECTS in Methods, 30 ECTS in Digital Technology, 48 ECTS in Management, and 30 ECTS through the Thesis. The students can select a specialization in the 48 Credits in the electives of Management. If they choose 30 ECTS or more in one area, this will be considered a specialization. Alternatively, they can choose modules from different specializations, which is regarded as the generalized track.

The specializations provide the following knowledge and skills:

Family Enterprise

In the family business sector and in SMEs, typically still exists the greatest need for the application of digital technologies. Since digitalization poses particular challenges for small and medium-sized companies, the degree program offers the opportunity to gain in-depth knowledge in the area of family-run businesses. In this specialization, students acquire interdisciplinary knowledge through modules that incorporate diverse perspectives (e.g. psychological, sociological, economic, and legal) to examine family enterprise behavior. Students can choose freely from the catalog of elective modules offered in the specialization, such as modules focused on sustainability, new technologies, and innovation, as well as strategy and governance in family enterprises.

Digital Enterprises

In the area of "Digital Enterprises", students primarily acquire management skills in order to be able to introduce digital technologies to the company on a larger scale. This specialization also focuses on new business models and business processes. Digital enterprises consist of novel processes, business modules, and management styles, which will be part of the offered modules in this specialization. Students are again free to choose elective modules offered in the specialization.

Master's Thesis

The master's program is completed in the 4th semester with the master's thesis (30 ECTS). In this thesis, students deal scientifically with a specific management or digital technology topic. To this end, students show their academic state of knowledge and discourse in writing and developing a specific research question. The students deal with the topic using the subject and methodological expertise acquired during 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 processing of the topic takes place in self-study, supported by feedback discussions with a supervising professor. This will strengthen the students' ability to work independently and to learn how to approach a project systematically as well as scientifically. The Master's thesis can be handed out and supervised by expert examiners of the TUM School of Management of the Technical University of Munich and by expert examiners of other faculties and schools teaching in the study program Management and Digital Technology. Master's theses in cooperation with

companies are generally possible. In terms of content, the thesis is designed to be completed within a time period of six months.

Studyability

TUM School of Management has developed corresponding study plans for three exemplary combination options to ensure the best possible study feasibility for students despite the wide range of options. One for each specialization and one for the general track without specialization. If this ideal-typical schedule is not feasible for every student, they will be able to make appropriate changes in the elective area by individually adapting their study plan to be able to acquire the specified 30 ECTS per semester. For individual planning of the study plan and for the planning of a semester abroad, the International Office and the Program Management offer weekly consultation hours, regular information events, and online seminars. Furthermore, the Buddy Program provides the possibility to be mentored by a student of a higher semester. The Buddy Program is organized by the Campus Administration.

Table 4: Exemplary study plan of the Master in Management and Digital Technology when choosing the management specialization “Digital Enterprises”: methods modules (dark grey), digital technology modules (light grey), management modules (light blue), master’s thesis (dark blue)

Semester	Modules					Credits/ number of exams
1st Semester	Generating and Processing Corporate Data MGTHN0106 (Elective) Written Exam 6 ECTS	Deep Reinforcement Learning WIHN0033 (Elective) Report 6 ECTS	Introduction to Capital Market Databases and Statistical Analysis Software WIHN0036 (Elective) Exercises 6 ECTS	Web Scraping with Python MGTHN0117 (Elective) Exercises 6 ECTS	Advanced Seminar Innovation & Entrepreneurship WIHN0028 (Elective) Research Paper 6 ECTS	30/5
2nd Semester	Advanced Multivariate Analysis MGTHN0107 (Elective) Written Exam 6 ECTS	Business Analytics with Python and R WIHN0039 (Elective) Report 6 ECTS	Eyetracking and Decision Making MGTHN0116 (Elective) Report 6 ECTS	Social Media Marketing MGTHN0112 (Elective) Research Paper 6 ECTS	Digital Finance WIHN0012 (Elective) Written Exam 6 ECTS	30/5
3rd Semester Mobility window	Advanced Project Studies MGTHN0119 (Elective) Project 12 ECTS		How to launch a platform start-up MGTHN0113 (Elective) Exercises 6 ECTS	Cases in industry 4.0 MGTHN0111 (Elective) Exercises 6 ECTS	Contemporary Strategies in the Automotive Industry MGTHN0074 (Elective) Presentation 6 ECTS	30/4
4th Semester	Master’s Thesis					30/1

7 Organization and Coordination

Program responsibility and coordination are the responsibility of the Vice Dean of Academic and Student Affairs of the TUM School of Management. The Vice Dean of Academic and Student Affairs is supported by the School Office. The Academic Program Director is also responsible for the program. On the study program level, the Master's Examination Board and the Aptitude Assessment Committee of the TUM School of Management are also responsible. The Master's Examination Board of the TUM School of Management is responsible for clarifying 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 Academic Program Director, and the responsible committees and commissions of the administration of the TUM School of Management, particularly the Divisions Undergraduate and Postgraduate Education, Quality Management and Marketing.

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

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

- Student Advising:
 - General Student Advising:
Student Advising and Information Services
(TUM CST)
E-Mail address: studium@tum.de
Telephone number: +49 (0)89 289 22245
offers information and advice for:
prospective students and enrolled students
(via hotline / service desk)
- Departmental Student Advising:
 - TUM School of Management, Program
Management
Sabrina Huber
E-Mail:
studentcounseling_heilbronn@mgt.tum.de
Telephone number: +49 (0)7131 264 – 18606
- Study abroad Advising / Internationalization:
 - TUM-wide: TUM Global & Alumni Office
E-Mail address: globaloffice@tum.de
Departmental: TUM School of Management –
International Office
E-Mail address:
internationaloffice_hn@mgt.tum.de
Telephone number: +49 (0) 7131 26418606

- Women's representative: TUM School of Management
Dr. Christian Feilcke
E-Mail address: office.ent@mgt.tum.de
Telephone number: +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 address: Handicap@zv.tum.de
Telephone number: +49 (0)89 289 22737
Departmental: TUM School of Management
E-Mail address:
prüfungsausschuss@mgt.tum.de
Telephone number: +49 (0)89 289 25086
- Admissions and Enrollment: TUM-wide: application and matriculation (TUM CST)
E-Mail address: studium@tum.de
Telephone number: +49 (0)89 289 22245
Admissions, enrollment,
Student Card, leave of absence,
student fees payment, withdrawal
- Aptitude Assessment: TUM-wide: Admissions and Enrollment (TUM CST)

Departmental: TUM School of Management
Admission Manager, Tanya Göttinger
E-Mail address:
admission_heilbronn@mgt.tum.de
Telephone number: +49 (0)7131 264 - 18703
- Tuition and scholarships: Fees and Scholarships (TUM CST)
E-Mail: beitragsmanagement@zv.tum.de
Scholarships and semester fees
- Examination Office: Department of Central Examination Matters (TUM CST), Campus Munich
Graduation documents, examination notices,
graduation certificates
- Departmental Examination Office: TUM School of Management
Grade Management, Annette Rank von Bronk
and Ulrike Zerrahn
E-Mail:
studentcounseling_heilbronn@mgt.tum.de
Telephone number: +49 (0)7131 264 - 18604
- Examination Board: President: Prof. Dr. Joachim Henkel
Secretary: Dr. Christian Feilcke

- Quality Management – Academic and Student Affairs

TUM-wide: Study and Teaching - Quality Management (TUM CST)

<https://www.tum.de/en/studies/teaching/quality-management>

Departmental: TUM School of Management

Vice Dean of Studies: Prof. Dr. Jürgen Ernstberger

Quality Management: Tanya Göttinger,

tanya.göttinger@tum.de, +49 (0)7131 264 - 18703

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sabrina.huber@tum.de, +49 (0)7131 264 - 18606

Evaluation Officer: Edo Octavianus

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Coordination of module management: Sonja Kopf,

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