Technische Hochschule Ingolstadt

Program and Course Description

Engineering and Management

Master of Engineering (M. Eng.)

Study regulation: WS 21/22

as per: 08.08.2024

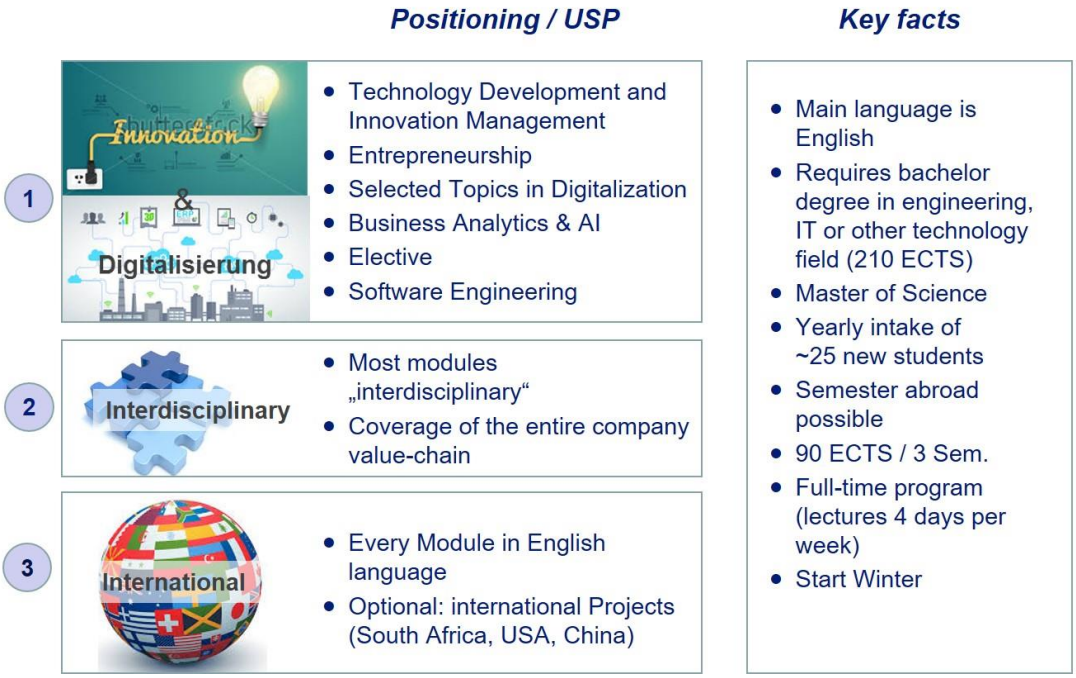
Content

1 Overview

Name of the program	Engineering and Management
Study type & degree	Consecutive Master of Science (full time)
First start date	WS 21/22; Start only in winter semester
Standard period of study	3 semesters (90 ECTS, 48 SWS)
Study location	THI-Campus in Ingolstadt
Language of instruction	English
Cooperation	None
Admission requirement	• Bachelor's degree at a German university with at least 210 ECTS credit points or an equivalent degree of a foreign university • Proof of English proficiency level B2 or higher (approved tests)
Capacity	35 students p.a.
Program director	Prof. Dr. Tobias Albrecht

2 Introduction

The Master program "Engineering and Management" of Technische Hochschule Ingolstadt addresses students who intend to work for international companies in functions which require both, an engineering background as well as a thorough understanding of management practices. The program focuses on three main topics: INNOVATION, INTERDISCIPLINARY, INTERNATIONAL (I^3). A short overview shows the following illustration:



The three main Topics of Innovation, Interdisciplinary and International will be taught on the basis of the entire value chain. The following illustration shows the different modules and their influence on the value chain.

2.1 Objectives

Based on their completed Bachelor´s program, graduates acquire and expand their knowledge, skills, and competencies to understand engineering and management in a digital and international environment.

Especially an in-depth knowledge of using new technologies and management methods in a broad variety of industries.

Furthermore, they can understand, develop, implement, and operate the general management tasks on the value chain.

They will be in the position to recognize the interdependency of technical, strategic, managerial, and social topics in a digital influenced international business.

2.2 Admission requirements

- General regulations:
    - Study and Examination Regulations for the master's degree program Engineering and Management (M. Sc.) of Technische Hochschule Ingolstadt as per 16.11.2020.
    - University Examination Regulation (Allgemeine Prüfungsordnung/APO) of Technische Hochschule Ingolstadt.
    - University Enrolment Statutes (Immatrikulationssatzung) of Technische Hochschule Ingolstadt.
    - State Examination Regulation (Rahmenprüfungsordnung/RaPO) of Technische Hochschule Ingolstadt.

  You can find all these regulations (in German and English) at the following link:

  https://www.thi.de/en/university/university-profile/university-management/legal-department/

- Proof of bachelor´s degree in engineering sciences, engineering and management, IT, sciences, or a degree in another related discipline at a German university with at least 210 ECTS credit points or an equivalent degree of a foreign university.
- All foreign applicants must submit their bachelor's degree to uni-assist, which verifies their eligibility and coverts their grades to the German grade system. Uni-Assist will issue a socalled preliminary inspection documentation (VPD) which you must upload to the application portal (like their other documents).
- Proof of English proficiency level B2 or higher.

2.3 Target group

The master´s program is designed for students who:

- are interested in the field of engineering and management with a clear focus of international and digital aspects.
- graduates of bachelor programs or young professionals with bachelor´s degree in engineering sciences, engineering and management, IT, sciences, or a degree in another related discipline.
- prospective students that prefer a master´s program fully taught in English, like to gain intercultural experience, and go for an international career at home and abroad.

2.4 Structure of the program

The program has the following structure:

1. Semester		
Digital Factory	International Management	Selected Topics in Digitalisation
Advanced Manufacturing Technologies	Management Accounting & International Taxation	Elective
2. Semester		
Business Analytics & Artificial Intelligence	Entrepreneurship & Innovation Management	Digital Marketing
Advanced Economics	Software Engineering	Scientific Research Seminar
3. Semester		
Master Thesis		

2.5 Prerequisites for advancement

To get the title of master´s thesis requires that at least 30 ECTS are achieved in the sequence of study. (please refer to Study and Examination Regulations / Studien- und Prüfungsordnung as of 16/11/20).

3 Qualification profile

The program is fully taught in English and welcomes both German and international students. It is designed as an interdisciplinary program at the interface of technology and business with a strong focus on international and digital aspects.

Four clusters offer a maximum of interdisciplinarity:

- Cluster digitalization
- Cluster technology
- Cluster business
- Cluster integrative

The graduates can apply the mainly used management methods among the supply chain. They can manage innovation processes; apply new technology in both the production and business processes. Assess those changes for the environment and society and can form business models.

The graduates can compile complex tasks within cross-functional and international teams, speak English fluently, work target-oriented and are able to present results.

3.1 Mission statement

The master´s program integrates the mission statement in the following ways:

We prepare our students for the challenges of the future:

- The master´s program creates future competence.
- It creates a spirit of innovation and teaches entrepreneurial thinking.
- It is an interdisciplinary program, which enables students to develop future-oriented solutions for interdisciplinary challenges.
- It qualifies students to help shape social changes such as the digital transformation and technological change. It sensitizes students to the sustainable use of the environment and resources, to socially responsible behavior and to social commitment.

We enable our students to develop solutions to problems based on scientific knowledge:

- The master´s program includes a lot of project work. This enables students to acquire applicable problem-solving skills.
- The lecturers transfer their practical experience and teach academic knowledge. They are professionally competent, are constantly developing in their areas of expertise and contribute their research experience to teaching.
- Students acquire professional, methodical, social and self-competences.

We open up outstanding regional and international perspectives for our students:

- The master´s program is fully taught in English, addresses international students and creates intercultural competences.
- In this way, the program contributes to a cosmopolitan, international campus.
- Our numerous cooperations with companies in the region enable our students to start their careers in the best possible way, both regionally and internationally.

We teach and learn through personal exchange:

- Because this is a Master's program, small groups and seminar-based forms of teaching are set to enable individual exchange with the students.
- The teaching concept offers digitalized courses (e.g. inverted classroom) in combination with many practical project studies to enhance the learning progress.
- The lecturers try out new ways of innovative and experimental teaching. For example, the first half of the semester concentrates on theoretical basics, the second half on practical application.

We help all students discover and realize their individual potential:

- The master´s program includes a lot of project work. In joint project work, our students gain social skills such as the ability to cooperate and deal with conflict, and leadership skills.
- The master´s program is international and intercultural. Hence, the program promotes performance in an appreciative cooperation. We meet each other with tolerance and openness and understand diversity as an opportunity to learn from each other and develop further.

3.2 Study objectives

3.2.1 Subject-specific competences of the study program

Professional competences:

The graduates:

- can analyze and develop digitalization and how this will impact an existing or a future business with all the aspects among the supply chain.
- are familiar with modern technologies and can develop, evaluate, use and market modern technologies for specific applications.
- can develop forward-looking business models and can use new technologies in different industries.
- can identify the opportunities and risks of operational and social transformation processes and know the success factors.

3.2.2 Interdisciplinary competences of the study program

Methodical competences:

The graduates are able

- to work scientifically.
- to plan, compile and lead projects.
- to apply new management and development methods in international and digital industries.
- to analyze interdisciplinary problems, to recognize comprehensive correlations, to transfer learned competences to new tasks and to evaluate the technical and social impact of compiled solutions.

Social competences:

The graduates are able

- to compile complex tasks in cross-functional and international teams, to solve conflicts in teams and to lead teams.
- to speak English fluently (incl. technical terms) and to react sensitively in intercultural affairs.
- to communicate their competences and to communicate generally.
- to convince and to become accepted.

Personal competences:

The graduates

- can organize themselves and to manage their time.
- have analytical and outcome-oriented intellectual power.
- work target-oriented and autonomously.
- can present results and themselves.

3.2.3 Examination concept of the study program

Module	Type of Exam
Digital Factory	SA mit Koll (seminar paper with colloquium)
Advanced Manufacturing Technologies	StA (student research project)
International Management	mdlP (oral examination)
Business Analytics & Artificial Intelligence	schrP (written examination)
Advanced Economics	schrP (written examination)
Management Accounting & International Taxation	schrP (written examination)
Entrepreneurship & Innovation Management	Proj (project work)
Selected Topics in Digitalization	StA (student research project)
Software Engineering	StA (student research project)
Digital Marketing	Proj (project work)
Elective	LN - depends on the elective
Scientific Research Seminar	Proj (project work)
Master Thesis	MA (Master Thesis)

For the form of examinations, please refer to Study and Examination Regulations for Master Engineering and Management, Appendix 1.

Below is an overview of the different examination formats with German acronym (as used in the "Studien- und Prüfungsordnung"), the English translation and a description.

Acronym	English title	Description
schrP	Written examination	The written examination is a written examination lasting 90 minutes, unless explicitly stated otherwise.
mdlP	Oral examination	The oral examination is an interview lasting 15 minutes per person, unless explicitly stated otherwise.
prP	Practical examination	Based on "real actions" of the student, it should be demonstrated that the student has mastered the practical application of the competences taught. The practical examination lasts 15 minutes unless explicitly stated otherwise.
StA	Student research project	Based on "real actions" of the student, it should be demonstrated that the student has mastered the practical application of the competences taught. The practical examination lasts 15 minutes unless explicitly stated otherwise.
SA	Seminar paper	The seminar paper is a term paper with an oral presentation. A term paper comprises a minimum of 3000 to a maximum of 6000 words (approx. 10 to 20 pages: Word document approx. 8 to 15 pages or Power Point approx. 15 to 20 slides). The oral presentation has a total length of 15-20 minutes and can also take place during the semester.
Proj	Project work	The project work is a group assignment in which several students work on a joint task as a team and present the results orally and in writing. Each student must contribute individually to the joint task and deliver an oral presentation lasting 15 minutes. The written part has a length of approx. 5-25 pages.
MA	Master thesis	Written thesis in the master's degree programme: Maximum processing time (= period between registration of the master's thesis and submission) of 6 months / length 60-80 pages
Coll	Colloquium	The colloquium is an oral examination lasting 10-15 minutes in which the student defends the results of his or her thesis.

3.2.4 Contribution of individual modules to the objectives of the program

Module	Professional competence	Methodology	Social competence	Personal competence
Digital Factory	++	++		
Advanced Manufacturing Technologies	++	+		
International Management	++	++	+	
Business Analytics & Artificial Intelligence	++	+		
Advanced Economics	++	+		
Management Accounting & International Taxation	++	+		
Entrepreneurship & Innovation Management	+	+	++	+
Selected Topics in Digitalization	+	++	+	
Software Engineering	++	+		
Digital Marketing	+	+	+	
Elective	+	++	+	++
Scientific Research Seminar	+	+	+	++
Master Thesis	+	+	++	+

3.3 Possible professional fields

Graduates of this program are in great demand. There is a wide field of application in specialist or management roles in national or international companies and organizations.

Graduates are especially well prepared to take on specialist and management roles in the following areas:

- Project Management.
- Product and Technology Management.
- Creativity and Innovation Management.
- Business Development.
- Entrepreneurship.
- Sustainability.

Graduates are also particularly well qualified for these tasks in an international context. Typical industries for the graduates of this program are:

- Mechanical and Electrical Engineering
- IT
- Mobility Industry
- Services
- Consultancy
- Education
- Cities and communities.

4 Description of Modules

4.1 Compulsory Modules

Digital Factory

Module abbreviation:	DigFact_M-EGM	**SPO-No.:**	1
Curriculum:	**Programme**	**Module type**	**Semester**
	Engineering and Management (SPO WS 21/22)	Compulsory Subject	1
Module attribute:	**Language of instruction**	**Duration of module**	**Frequency of offer**
	English	1 semester	only winter term

Responsible for module:	Axmann, Bernhard
Lecturers:	Axmann, Bernhard
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h Self-study: 78 h Total workload: 125 h
Subjects of the module:	1: Digital Factory
Lecture types:	SU/Ü-Seminar with exercises
Examinations:	SA+Koll - written elaboration 8-15 pages, presentation 15-20 slides; oral exam 15 Min.
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).

Prerequisites according examination regulation:

none

Recommended prerequisites:

Interest in Software and Digital Tool

Objectives:

Students are able to:

- develop knowledge to apply methods for scientific work to topics of the digital factory.
- generate basic understanding of software applications for factory operation.
- evaluate the tasks of the digitalizations of the factory, the resulting challenges and possible approaches to solutions in Industry 4.0.
- develop an understanding of data quality and data management.
- generate knowledge about the challenges of digitalization.
- determine specific problems in the area of digitalization using a systematic approach, evaluate them and identify alternative solutions.

Content:

- Short recap: Scientific work
- Short recap: Basics on Digital Factory / Industry 4.0
- Overview of the basics of AI and its application in industrial operations
- Main focus: Overview of software applications in industrial operations- predictive Maintenance
  - Logistic
  - Purchase
  - Sales
  - Production
  - Engineering

- Quality
- Personal

- Basics of data and the importance of data quality
- Challenges in the digitalization of an industrial company using the example of SMEs and corporations

Application in Thesis

- Evaluation with 5D of software applications in the digital factory
- or practical application of RPA or chatbot and evaluation with cost-benefit and break-even.

Literature:

- AXMANN, Bernhard, SCHULDT, Tino, SOLIS, Lesly, 2021. Vergleich von Methoden zur Auswahl Digitaler Technologien für KMU. In: *ZWF*. p.735-739. ISSN zwf-2021-0148
- AXMANN, Bernhard, HARMOKO, Harmoko, JANIESCH, Christian, HARMS, Lukas, 2021. A Framework of Cost Drivers for Robotic Process Automation Projects. In: Lecture Notes in Business Information Processing. In: *Springer International Publishing*. p.7-22. ISSN 10.1007/978-3-030-85867-4_2
- AXMANN, Bernhard, HARMOKO, Harmoko, 2022. Process & Software Selection for Robotic Process Automation (RPA). In: *Tehnički glasnik*. ISSN 10.31803/tg-20220417182552
- FELSER, M., 2023. *Digital Factory Transformation: A Guide to Implementing Industry 4.0*. London: Springer Verlag.
- HUANG, G. Q., Y. F. ZHANG and K. L. MAK, 2023. *Smart Manufacturing: Concepts and Applications*. New York: Wiley.
- ROSEN, R., D. ZÜHLKE and G. LANZA, 2024. *The Digital Factory: Building the Smart Factory of the Future*. Berlin: De Gruyter.
- KAGERMANN, H. and others, 2024. *Industry 4.0 in a Global Context: Strategies for Cooperating Globally*. New York: Springer.

Additional remarks:

No additional remarks.

Advanced Manufacturing Technologies

Module abbreviation:	Adv_Man_Tech_M-EGM	**SPO-No.:**	2
Curriculum:	**Programme**	**Module type**	**Semester**
	Engineering and Management (SPO WS 21/22)	Compulsory Subject	1
Module attribute:	**Language of instruction**	**Duration of module**	**Frequency of offer**
	English	1 semester	only winter term

Responsible for module:	Bednarz, Martin
Lecturers:	Bednarz, Martin
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h Self-study: 78 h Total workload: 125 h
Subjects of the module:	2: Advanced Manufacturing Technologies
Lecture types:	SU/Ü-Lecture with exercises
Examinations:	StA - Student research project 8-15 pages
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).

Prerequisites according examination regulation:

None

Recommended prerequisites:

None

Objectives:

Students

- get to know advanced manufacturing technologies and their industrial applications.
- can deduct advantages and disadvantages of different technologies.
- are gathering process know-how and understand the physical principles of these technologies.
- learn the latest trends in the industry.
- practice how to work and communicate in teams.
- know how modern manufacturing technologies may affect work processes and society.

Content:

Advanced Manufacturing Technologies e.g.:

- Additive Manufacturing
- Laser Technologies
- Technologies for battery production
- Manufacturing technologies of fibre reinforced plastics

Literature:

- GROOVER, Mikell P., 2013. *Fundamentals of modern manufacturing: materials, processes, and systems*. 5. edition. Hoboken, NJ: Wiley. ISBN 978-1-118-231463
- BRECHER, Christian, 2015. *Advances in production technology* [online]. Cham [u.a.]: Springer PDF E-Book. ISBN 978-3-319-12304-2, 978-3-319-12303-5. Available via: http://dx.doi.org/10.1007/978-3-319-12304-2.

• KALPAKJIAN, Serope and Steven R. SCHMID, 2014. *Manufacturing engineering and technology*. 7. edition. Singapore [u.a.]: Pearson. ISBN 978-0-13-312874-1, 978-981-06-9406-7
Additional remarks:
No additional remarks.

International Management

Module abbreviation:	Int_Mgt_M-EGM	**SPO-No.:**	3
Curriculum:	**Programme**	**Module type**	**Semester**
	Engineering and Management (SPO WS 21/22)	Compulsory Subject	1
Module attribute:	**Language of instruction**	**Duration of module**	**Frequency of offer**
	English	1 semester	only winter term

Responsible for module:	Schneider, Yvonne
Lecturers:	Schneider, Yvonne
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h Self-study: 78 h Total workload: 125 h
Subjects of the module:	3: International Management
Lecture types:	SU/Ü-Lecture with exercises
Examinations:	mdlP - oral exam, 15 minutes
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).

Prerequisites according examination regulation:

None

Recommended prerequisites:

None

Objectives:

By actively participating in this course, students should be able to:

- understand key terms and challenges while conducting international business.
- analyse how international firms are embedded in the global economy and contribute to international trade and foreign direct investment.
- compare options firms have and how they can operate internationally.
- determine the complexity of relationships between headquarters and subsidiaries.
- differentiate between challenges of the environment that multinational enterprises face, incl. cultural differences, political influence, international trade agreements.
- evaluate options for managing organisational structure and culture in an international environment.
- explain the multi-dimensional nature of internationalization strategies.
- assess how the international dimension of strategy can help to build a company's competitive advantage.
- gain ability to critically reflect upon internationalization, its antecedents and consequences.
- understand the importance of intercultural competencies by leading international teams.

Cases and examples are integrated through the course to reinforce and clarify major topics.

Content:

This module provides a general overview on principles and challenges of International Management. Among others, the following aspects will be discussed:

- Introduction into globalization and international business
- International business environment: culture, politics, economy

- International trade and investment: government influence, cross-national cooperation
- Internationalization strategies (process, market entry modes, etc.)
- Internationalization and corporate social responsibility and business ethics
- Specifics of multinational companies, such as:
  - Organizational structure of multinational companies
  - Leadership and human resource management in multinational companies
  - Strategic management of multinational corporations
  - Cultural differences and impact as cause for differences

Literature:

- DERESKY, Helen and Stewart R. MILLER, 2023. *International management: managing across borders and cultures: text and cases*. T. edition. Harlow: Pearson. ISBN 978-1-292-43036-2
- HILL, Charles W. L., 2023. *International business: competing in the global marketplace*. 14. edition. New York: McGraw-Hill. ISBN 978-1-265-03854-0
- MORSCHETT, Dirk, SCHRAMM-KLEIN, Hanna, ZENTES, Joachim, 2015. *Strategic International Management: Text and Cases* [online]. Wiesbaden: Springer Fachmedien Wiesbaden PDF E-Book. ISBN 978-3-658-07884-3. Available via: https://doi.org/10.1007/978-3-658-07884-3.

Additional remarks:

No additional remarks.

Business Analytics & Artificial Intelligence

Module abbreviation:	BusAn_AI_M-EGM	**SPO-No.:**	4
Curriculum:	**Programme**	**Module type**	**Semester**
	Engineering and Management (SPO WS 21/22)	Compulsory Subject	2
Module attribute:	**Language of instruction**	**Duration of module**	**Frequency of offer**
	English	1 semester	only summer term

Responsible for module:	Bock, Jürgen
Lecturers:	Bock, Jürgen; Radtke, Max
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h Self-study: 78 h Total workload: 125 h
Subjects of the module:	4: Business Analytics & Artificial Intelligence
Lecture types:	SU/Ü-Lecture with exercises
Examinations:	schrP90 - written exam, 90 minutes
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).

Prerequisites according examination regulation:

None

Recommended prerequisites:

None

Objectives:

The students are able to

- explain the various conflict of objectives of supervised learning.
- apply different models of supervised learning.
- assess the quality of different models of supervised learning.
- apply different clustering methods.
- practically implement various machine learning methods using common software libraries.
- distinguish between different areas of artificial intelligence and select suitable technologies for specific fields of application.
- explain the basic principles and special concepts of formal knowledge representation.
- transfer concrete domain knowledge into a formal knowledge model and provide added value through automatic reasoning.

Content:

- Linear regression
- Various classification algorithms
- Various clustering techniques
- Artificial Neural Networks
- Implementation of Machine Learning algorithms using suitable software tools and libraries
- Definition of Artificial Intelligence and overview over subdisciplines
- Formal knowledge representation and automatic reasoning

Literature:
• JAMES, Gareth and others, 2021. *An introduction to statistical learning: with applications in R*. S. edition. New York, NY: Springer. ISBN 978-1-0716-1417-4, 1-0716-1417-7 • BISHOP, Christopher M., 2016. *Pattern recognition and machine learning*. softcover reprint of the original 1st edition 2006. edition. New York, NY: Springer. ISBN 978-1-4939-3843-8
Additional remarks:
No additional remarks.

Advanced Economics

Module abbreviation:	Adv_Econ_M-EGM	**SPO-No.:**	5
Curriculum:	**Programme**	**Module type**	**Semester**
	Engineering and Management (SPO WS 21/22)	Compulsory Subject	2
Module attribute:	**Language of instruction**	**Duration of module**	**Frequency of offer**
	English	1 semester	only summer term

Responsible for module:	Eisenberg, Andrea
Lecturers:	Eisenberg, Andrea
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h Self-study: 78 h Total workload: 125 h
Subjects of the module:	5: Advanced Economics
Lecture types:	SU/Ü-Lecture with exercises
Examinations:	schrP90 - written exam, 90 minutes
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).

Prerequisites according examination regulation:

None

Recommended prerequisites:

None

Objectives:

The students get to:

- understand the importance of global economic system and problems for strategic business decisions in globally active companies.
- be able to evaluate challenges resulting from globalization and growing international business transactions.
- understand global economic problems, international economic relations and economic policy.
- understand how the international monetary system works.
- achieve an in-depth understanding of micro- and macroeconomic interrelationships.

Content:

- Advanced Microeconomic theory: supply and demand, economic actors
- Advanced Macroeconomics: inflation, unemployment, economic growth
- Institutional economics and international economic organizations
- International trade and globalization
- Interest rates, international monetary policy and currency systems

Literature:

- MANKIW, Nicholas Gregory and Mark P. TAYLOR, 2023. *Economics*. s. edition. Andover, Hampshire: Cengage. ISBN 978-1-4737-8698-1
- MCDOWELL, Moore, 2012. *Principles of economics*. 3. edition. London [u.a.]: McGraw-Hill Education. ISBN 0-07-713273-4, 978-0-07-713273-6

• TAYLOR, Timothy, 2022. *Principles of Economics. PDF* [online]. PDF e-Book.
Additional remarks:
No additional remarks.

Management Accounting & International Taxation

Module abbreviation:	MgtAcc_IntTax_M-EGM	**SPO-No.:**	6
Curriculum:	**Programme**	**Module type**	**Semester**
	Engineering and Management (SPO WS 21/22)	Compulsory Subject	1
Module attribute:	**Language of instruction**	**Duration of module**	**Frequency of offer**
	English	1 semester	only winter term

Responsible for module:	Albrecht, Tobias
Lecturers:	Albrecht, Tobias; Eisenberg, Andrea
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h Self-study: 78 h Total workload: 125 h
Subjects of the module:	6: Management Accounting & International Taxation
Lecture types:	SU/Ü-Lecture with exercises
Examinations:	schrP90 - written exam, 90 minutes
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).

Prerequisites according examination regulation:

None

Recommended prerequisites:

None

Objectives:

Students are capable to

- understand the importance of international taxation systems for strategic decision-making.
- achieve sound understanding of the most important aspects of international company taxation.
- understand the core concepts of cost and management accounting.
- use advanced management accounting concepts as a base for strategic management in global companies.

Content:

- Economics of public sector, the tax systems
- International taxation: taxation of global groups, Value added tax, withholding tax, transfer pricing
- Principles of Cost Accounting
- Advanced management accounting systems
- Budgeting and strategic planning as a base for strategic decisions making

Literature:

- ATRILL, Peter and Edward J. MCLANEY, 2021. *Management accounting for decision makers*. t. edition. Harlow: Pearson Education Limited. ISBN 978-1-292-34945-9
- DOERNBERG, Richard L., 2009. *International taxation: in a nutshell*. 8. edition. St. Paul, Minn.: Thomson/West. ISBN 0-314-19424-X, 978-0-314-19424-4

Additional remarks:

No additional remarks.

Entrepreneurship & Innovation Management

Module abbreviation:	ES_Inno_Mgt_M_EGM	**SPO-No.:**	7
Curriculum:	**Programme**	**Module type**	**Semester**
	Engineering and Management (SPO WS 21/22)	Compulsory Subject	2
Module attribute:	**Language of instruction**	**Duration of module**	**Frequency of offer**
	English	1 semester	only summer term

Responsible for module:	Schwandner, Gerd
Lecturers:	Albrecht, Tobias
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h Self-study: 78 h Total workload: 125 h
Subjects of the module:	7: Entrepreneurship & Innovation Management
Lecture types:	S-Seminar
Examinations:	Proj - Project work with oral presentation (15 min) and written elaboration (5 - 25 pages)
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).

Prerequisites according examination regulation:

None

Recommended prerequisites:

None

Objectives:

The students get to:

- understand the challenges and pitfalls of starting-up a company.
- comprehend important aspects of innovations.
- be able to apply innovation management tools.
- know how to implement start-up specific management concepts.
- be able to develop convincing business plans.
- be able to effectively work as a team.
- further improve their presentation skills.
- understand the relevance of innovation and entrepreneurship for society.
- understand the effectiveness of intercultural competencies by developing innovative ideas.

Content:

Theory

- What is entrepreneurship?
- Innovation: types, sources, how to find?
- Innovation management and strategy
- Start-ups: strategy agile product development, marketing, financing
- Business plans
- Other relevant topics: e.g. legal forms, intellectual property right

Start-up project:

- Creating of a business concept along 3 milestones, incl. pitch-presentations
- Formulating a business plan as a team
- Development of a prototype/mock-up ad a pitch-Videos

Literature:

- KAWASAKI, Guy, 2015. *The art of the start 2.0: the time-tested, battle-hardened guide for anyone starting anything*. London: Portfolio Penguin. ISBN 978-0-241-18726-5
- RIES, Eric, 2019. *The lean startup: how constant innovation creates radically successful businesses*. London: Penguin Business. ISBN 978-0-670-92160-7

Additional remarks:

No additional remarks.

Selected Topics in Digitalization

Module abbreviation:	SelTop_Digi_M-EGM	**SPO-No.:**	8
Curriculum:	**Programme**	**Module type**	**Semester**
	Engineering and Management (SPO WS 21/22)	Compulsory Subject	1
Module attribute:	**Language of instruction**	**Duration of module**	**Frequency of offer**
	English	1 semester	only winter term

Responsible for module:	Zehbold, Cornelia
Lecturers:	Zehbold, Cornelia
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h Self-study: 78 h Total workload: 125 h
Subjects of the module:	8: Selected Topics in Digitalization
Lecture types:	SU/Ü-Lecture with exercises
Examinations:	StA - Student research project 8-15 pages
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).

Prerequisites according examination regulation:

None

Recommended prerequisites:

Basics of Business Information Systems

Objectives:

Students:

- get to know the drivers of digitalization as well as the typical phases, from digitizing existing processes to new digital business models and ecosystems.
- gain insights into the possible effects of digitalization in society.
- understand that it is no longer acceptable to just look at processes and data in isolation.
- work with current software.
- practice digital collaboration in teams.
- can analyse problems in the field of digitalization, using a systematic approach, and to present alternative solutions.

Content:

- Disruptive technologies
- Drivers of digitalization
- Dimensions of digitalization briefly: business models, processes, products, integration and communication of products with the environment, human-machine interface
- Digital business models and value networks
- Digital business processes
- Process mining and Robotic Process Automation (RPA)

Literature:
• MORABITO, Vincenzo, 2016. *The Future of Digital Business Innovation: Trends and Practices [online]* [online]. *PDF E-Book*. Switzerland: Springer PDF E-Book. ISBN 978-3-319-26874-3, 978-3-319-26873-6. Available via: https://doi.org/10.1007/978-3-319-26874-3.
Additional remarks:
Literature depends on the topics the students are working on.

Software Engineering

Module abbreviation:	SW_Eng_M-EGM	**SPO-No.:**	9
Curriculum:	**Programme**	**Module type**	**Semester**
	Engineering and Management (SPO WS 21/22)	Compulsory Subject	2
Module attribute:	**Language of instruction**	**Duration of module**	**Frequency of offer**
	English	1 semester	only summer term

Responsible for module:	Bock, Jürgen
Lecturers:	Bock, Jürgen; Radtke, Max
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h Self-study: 78 h Total workload: 125 h
Subjects of the module:	9: Software Engineering
Lecture types:	SU/Ü-Lecture with exercises
Examinations:	StA - Student research project 8-15 pages
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).

Prerequisites according examination regulation:

none

Recommended prerequisites:

None

Objectives:

After participating in this module students are able to:

- explain the foundations of software engineering.
- analyse and structure software requirements.
- formally describe software components and interfaces.
- develop, test and document simple software components in a high-level programming language.
- use development tools (software engineering toolchain) effectively.
- cooperate in and across teams during the development of software applications.

Content:

- Foundations of software engineering
- Systematic analysis of software requirements
- Modelling of requirements and components of a software product
- Specification and documentation of software component interfaces
- Development of software modules in teams including test and documentation
- Consistent use of software engineering tools (IDE, source code-, build-, artifact-management)

Literature:

- THOMAS, David and Andrew HUNT, 2020. *The pragmatic programmer: your journey to mastery*. 20. edition. Boston: Addison-Wesley. ISBN 978-0-13-595705-9, 0-13-595705-2
- MILES, Russ and Kim HAMILTON, 2006. *Learning UML 2.0: [a pragmatic introduction to UML]*. 1. edition. Sebastopol, CA: O'Reilly & Associates. ISBN 0-596-00982-8

- GAMMA, Erich and others, 1994. *Design Patterns - Elements of Reusable Object-Oriented Software*. ISBN 0-201-63361-2

Additional remarks:

No additional remarks.

Digital Marketing

Module abbreviation:	Digi_Mkt_M-EGM	**SPO-No.:**	10
Curriculum:	**Programme**	**Module type**	**Semester**
	Engineering and Management (SPO WS 21/22)	Compulsory Subject	2
Module attribute:	**Language of instruction**	**Duration of module**	**Frequency of offer**
	English	1 semester	only summer term

Responsible for module:	Albrecht, Tobias
Lecturers:	Bilger, Rebecca
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h Self-study: 78 h Total workload: 125 h
Subjects of the module:	10: Digital Marketing
Lecture types:	S-Seminar
Examinations:	Proj - Project work with oral presentation (15 min) and written elaboration (5 - 25 pages)
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).

Prerequisites according examination regulation:

None

Recommended prerequisites:

None

Objectives:

The student has the following abilities after finalizing this course:

- the skill for Search Engine Optimization and Marketing.
- how to handle with Big Data and Decision Making.
- to know how to use social media management as well as SEO/SEM.
- the skill to identify consumer behaviour.

Content:

- Introduction of Big Data and Data-Analytics
- How to use Tools like SEO/SEM?
- What are intellectual properties?
- How to use Web-Analytics?
- How to build and use a Brand?

Literature:

- KOTLER, Milton, CAO, Tiger, WANG, Sam, QIAO, Collen, ZHANG, Yuheng, 2020. *Marketing strategy in the digital age: applying Kotler's strategies to digital marketing* [online]. New Jersey: World Scientific PDF e-Book. ISBN 978-981-121-698-5, 978-981-121-699-2. Available via: https://doi.org/10.1142/11737.
- KOTLER, Philip, Hermawan KARTAJAYA and Iwan SETIAWAN, 2021. *Marketing 5.0: technology for humanity*. Hoboken (New Jersey): Wiley. ISBN 978-1-119-66854-1, 978-1-119-66857-2

Additional remarks:
No additional remarks.

Scientific Research Seminar

Module abbreviation:	Sc_Res_Sem_M-EGM	**SPO-No.:**	12
Curriculum:	**Programme**	**Module type**	**Semester**
	Engineering and Management (SPO WS 21/22)	Compulsory Subject	2
Module attribute:	**Language of instruction**	**Duration of module**	**Frequency of offer**
	English	1 semester	only summer term

Responsible for module:	Albrecht, Tobias
Lecturers:	Albrecht, Tobias
Credit points / SWS:	5 ECTS / 2,5 SWS
Workload:	Contact hours: 47 h Self-study: 78 h Total workload: 125 h
Subjects of the module:	12: Scientific Research Seminar
Lecture types:	S-Seminar
Examinations:	Proj - Project work with oral presentation (15 min) and written elaboration (5 - 25 pages)
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).

Prerequisites according examination regulation:

None

Recommended prerequisites:

None

Objectives:

The students:

- can successfully process a complex task within one semester.
- are able to work independently into a new, challenging theme.
- are able to document and present their project results.
- have strong methodological and social competency in areas such as communication, project management and time management.

Content:

- Processing of a semester-accompanying scientific question differs from semester to semester. Several topics are offered, from which one can be selected.
- The task is a scientific question and is handled by the student on his own responsibility.
- At the end of the semester, the results are summarized in the form of a project work (5-25 pages) and a presentation (15 minutes).

Literature:

- BUI, Yvonne, 2019. *How to Write a Master's Thesis*. 3. edition. ISBN 978-1506336091

Additional remarks:

No additional remarks.

Master Thesis

Module abbreviation:	Ma_Thes	**SPO-No.:**	13
Curriculum:	**Programme**	**Module type**	**Semester**
	Engineering and Management (SPO WS 21/22)	Compulsory Subject	3
Module attribute:	**Language of instruction**	**Duration of module**	**Frequency of offer**
	English	1 semester	only winter term

Responsible for module:	Albrecht, Tobias	
Lecturers:		
Credit points / SWS:	30 ECTS / 0 SWS	
Workload:	Contact hours:	0 h
	Self-study:	750 h
	Total workload:	750 h
Subjects of the module:	13: Master Thesis	
Lecture types:	MA-Master Thesis	
Examinations:	Master-Thesis	
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).	

Prerequisites according examination regulation:

None

Recommended prerequisites:

None

Objectives:

The students:

- can carry out autonomously a complex problem in engineering and management at the interface of technology, economy and sociology on a high scientific level.
- can apply the acquired skills and scientific methods.
- can integrate the results into a professional context and to present them in a scientific paper.

Content:

- Complex problems in foresight at the interface of technology, economy and sociology with integration of results into a professional context
- Presentation in form of scientific paper

Literature:

- SUBHASH CHANDRA, Parija and Kate VIKRAM, 2018. *Thesis Writing for Master's and Ph.D. Program*. 1. edition. ISBN 978-9811308895
- BUI, Yvonne N., 2019. *How to Write a Master's Thesis*. 3. edition. ISBN 978-1506336091

Additional remarks:

No additional remarks.

4.2 Individual Electives

Starting with winter semester 2024/25, there will be a separate module handbook for the descriptions of the elective modules, which is part of the semester curriculum for the master's degree program "Engineering and Management". This can also be found on the Moodle page of your degree program under Curriculum/Module Handbooks.

Note:

Please note that not all modules listed in the module handbook for electives can be selected for your degree program. The current list of selectable modules for your degree program can be found on the Moodle page of your degree program under Information on Electives. Link:

https://moodle.thi.de/course/view.php?id=7456&section=2