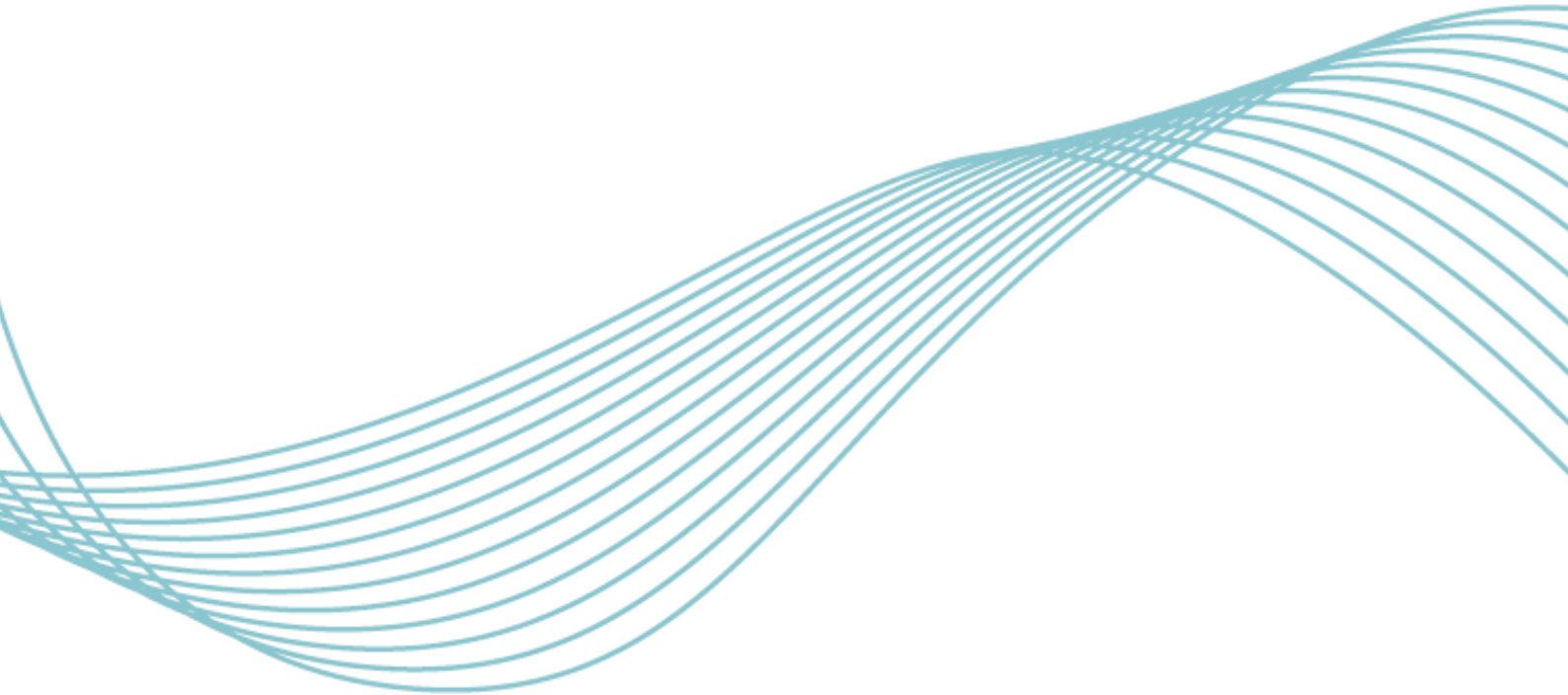
University of Applied Sciences
HOCHSCHULE EMDEN·LEER

Module Handbook
Master Study Program
Technical Management



University of Applied Sciences Emden/Leer
Faculty Technology
Division Mechanical Engineering

Master Degree Program

(Version: 2020)

Table of Content

1. Overview

Faculty	Technology
Division	Mechanical Engineering
Degree	Master of Engineering (MEng)
Standard period of study	3 Semester
Total Workload	90 ECTS

1.1 Introduction

Technical Management is an accredited further education Master Program aiming at Bachelor degree students, preferably from the fields of mechanical engineering or science, who completed a minimum of one year full time work experience. The program has a standard course duration of 3 semesters (1, 5 years) with a total workload of 90 ECTS. The awarded degree is 'Master of Engineering' (MEng).

The Master's study program of Technical Management prepares students for the balancing procedure of managing both technical processes and laborer together with utilizing technical skills to provide the required environment for project achievements. Prospective students will strive for a successful career in leading positions, such as areas of project management, business administration or technological processes.

The program of Technical Management targets international students who aspire to a position in an international or multi-cultural context. In addition, increasing professional expertise enables students to enhance their career perspectives and their interpersonal development. Reliability and success with regard to technical processes and products is a major aspect during the study program.

The Master's program Technical Management pursues several objectives to enhance the professional expertise of students. Therefore, students are able to achieve additional qualifications in the following three main areas:

- Technical competences
- Professionalization; Expansion of social and personal competencies
- Business competences such as an introduction to the fundamentals of economy, law and diverse aspects of management

The introductory modules in the fields of professionalization and business are carried out on a master's level. The students of the study program have obtained a minimum work experience of one year, after completing their Bachelor studies. These studies were mainly related to topics in the engineering sphere, however, most of the students gained a first glance in management and business administration by elective subjects. Moreover, the professional work experience subsequently enhanced student's organizational and interpersonal view on entrepreneurial skills and working environment. The international profile of the students stays in close affiliation with the modules of the Master's Study Program Technical Management. The prerequisites and background of the students enable to follow the contents of the master's study and to keep up with the learning goals.

1.2 Module structure

Modules Master Technical Management			
Master Thesis & Colloquium	28 ECTS	**30 ECTS**	**3. Semester**
Introduction to Scientific Working	2 ECTS		

Technical Modules		**Professionalization**		**Business Modules**			
Computer Sciences* 5 ECTS	Technical Module** 5 ECTS	Introduction to Data Science* 5 ECTS	Professionali-zation Module** 5 ECTS	Business Management* 5 ECTS	Business Module** 5 ECTS	**30 ECTS**	**2./1. Semester**
Introductory Future Studies for Engineers* 5 ECTS	Technical Module** 5 ECTS	Communi-cation& Culture* 5 ECTS	Professionali-zation Module** 5 ECTS	Marketing* 5 ECTS	Business Module** 5 ECTS	**30 ECTS**	**1./ 2. Semester**

Legend: *** Mandatory module** ****Elective module**

Technical Modules	**Professionalization**	**Business Modules**
• Computer Sciences • Introductory Future Studies for Engineers • Advanced Materials • Energy Engineering • Intelligent Automation • Production Systems • Modeling and Simulation • "Recent Topic" • Project	• Communication & Culture • Introduction to Data Science • Advanced Project Management for Engineers • Innovation Management • Leadership & Negotiation • Quality Management	• Business Management • Marketing • Controlling • International Commercial Law • ERP- Systems • Strategic Management • "Recent Topic" • Project

1.3 General Definitions

Every module of Technical Management follows the principles below:

- English is the obligatory language of all modules and courses.
- One module has a time span of one semester and a successfully completed semester is rewarded with 30 ECTS.
- Every successfully completed module rewards students with 5 ECTS.
- The program has a modular structure, comprising mandatory and elective modules. These modules enable an interdisciplinary study in the fields of key qualifications, economics and technology.
- Generally, the order of modules is arbitrary and some of the elective courses are upon necessity. For particular courses the requirements of the module handbook are applicable. Thus, students are able to attend the offered courses each semester.
- By taking optional compulsory modules, individual specialization and deepening is possible. The scope of the compulsory modules is 30 credit points (ECTS). The modules from the compulsory elective area amount to 30 credit points (ECTS). In addition, there is the Master's thesis with colloquium amounting to 30 credit points. One credit point corresponds to 30 hours of work for the student.
- Courses not being part of the general curriculum of the study program Technical Management are available upon request. A participation above 60% leads to a selection of the course as an elective module.
- The modules from the first and second semesters do not build on each other in terms of content, so that it is possible to start studying in the summer or winter semester. In the summer semester the modules of the first semester are offered, in the winter semester the modules of the second semester. Students who begin their studies in the summer semester first hear the courses from the first semester. In the following semester, they hear the courses from the second semester. For students who begin their studies in the winter semester, the order is reversed.

1.4 Abbreviations

(DV)	Computer device
(K) (Number)	Written Exam (processing time in hours)
(M)	Oral exam
(P)	Project
(R)	Report
(SPPW)	Semester Periods per Week

2. Mandatory Modules

2.1 Introduction to Data Science (Winter semester)

Lecturer in charge:	Prof. Dr. Elmar Wings
Form:	Lectures, exercises, case studies
Type:	Mandatory module
Prerequisite for participation:	
Applicability of the module:	MaII
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Report
ECTS:	5

Competences

Data Science is an interdisciplinary subject that brings together the fields of computer science, mathematics and the respective application area. After this course, students understand how all three areas are equally considered. Students know the essential components of data analysis and their tasks. They are familiar with the basic functions of the components. Students know the general structure of the components and can illustrate and apply the basic algorithms and methods. They are not only familiar with libraries, frameworks, modules and toolkits, but can also use and implement them in a concrete way. Thus, they develop a deeper understanding of the interrelationships and learn how essential tools and algorithms of data analysis work in the core.

Content

The course includes an introduction to Python 3 and its ecosystem. The basics of Linear Algebra, Statistics and Probability Theory are developed and applied in Data Science. Furthermore, different algorithms from the field of data science and their application areas are presented. Models are shown, e.g. k-nearest Neighbors, Naive Bayes, linear and logistic regression, decision trees, neural networks and clustering. Different methods of supervised, unsupervised and empowering learning are discussed.

Literature

- Chesterton, Scott: Machine Learning: This Book Includes Machine Learning for Beginners, Artificial Intelligence and Machine Learning for Business, Networking for Beginners, Independently Published, 2019
- Grus, Joel: Data Science from Scratch: First Principles with Python, 2016, O'Reilly

Course

Lecturer	**Title**	**SPPW**
Prof. Dr. Elmar Wings	Introduction to Data Science	4

2.2 Business Management (Winter semester)

Lecturer in charge:	Prof. Dr. Olaf Passenheim
Form:	Lecture with case study and plenum presentation, block seminar business simulation game
Type:	Mandatory module
Prerequisite for participation:	
Applicability of the module:	MaBM
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Written exam **(**K2), Oral exam (M)
ECTS:	5

Competences

The students know the basic steps and preparations required for the operative processing of domestic and foreign markets. The participants know the different organizational forms of companies as well as their advantages and disadvantages. Through the theoretical presentation and practical discussion of examples, an understanding of the most important theories, principles and methods of the effects of ethical, sustainable and social requirements on a company is also conveyed. In the last section of the lecture, students will be able to apply the process of human resource management. Through group work, graduates of the program have broad knowledge and teamwork and social skills are actively applied, which the participants use when assuming team responsibility in their professional activities.

- By using plenary discussions and group work, participants will train their teamwork and social skills to prepare them for leadership positions.
- Case studies are carried out
- Business Simulation Game

Content

Through the presentation and discussion of various management theories the changing responsibilities of management over the last years will be shown in the beginning. This basic understanding will lead to the introduction of the various different organizational forms and operational structure of international companies with their advantages and disadvantages. Based on various practical examples it will be shown and discussed how and why companies regularly change their business organization. Significant influences on this change have external and internal reasons. External reasons may e.g. changing legal situations, new competitors or social requirements of sustainability or responsibility. Strategy changes, new products or markets, sales development etc. are the factors for an internal reorganization. A business organization lives on and with their employees. What is easily manageable for small enterprises requires an own HR department at larger enterprises. Based on a process model, an understanding of the various tasks of (international) HRM-departments, such as planning, finding and developing people will be developed.

Literature

- Brooks, S. and Saltzmann, J.: Creating the Vital Organization: Balancing Short-Term Profits with Long-Term Success; Palgrave Macmillan, 2016
- Deresky, H.: International Management. Managing Across Borders and Cultures. Text and Cases, 7th edition, Prentice Hall, 2010
- Machado, C.: International Human Resources Management; Springer 2015
- Motohashi, K.: Global Business Strategy: Multinational Corporations Venturing into Emerging Markets; Springer 2015

Course

Lecturer	**Title**	**SPPW**
Prof. Dr. Olaf Passenheim	Business Management	2
Prof. Dr. Olaf Passenheim	Business Simulation Game	2

2.3 Communication & Culture (Summer semester)

Lecturer in charge:	Prof. Maria Krüger-Basener
Form:	Lecture and Seminar in combination
Type:	Mandatory module
Prerequisite for participation:	
Applicability of the module:	MaBM, MaMb, MaII
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Oral exam (Case Studies (M 30 min)) or Written exam (Case Studies (K 90 min))
ECTS:	5

Competences

Students know theories on cultures and intercultural communication and understand the historical genesis of communication differences. The students perceive cultural differences in communication for concrete situations and can reflect, adapt and optimize their own personal behaviour.

Students are capable to cope with cultural diversity in given communication settings with focus on business related situations.

Content

- Cultural Information: Germany in Comparison to selected students‘ countries of origin: Values and norms in business and in everyday life
- Basics of interpersonal communication
- Development of international communication in the course of time
- Models and theories on international communication, also within international enterprises
- Communication in international teams
- International communication systems and virtual team work

Literature

- Glover, Jerry; Friedman, Harris L. (2015): Transcultural competence. Navigating cultural differences in the global community. First Edition
- Hall, Edward T.; Hall, Mildred Reed (1990): Understanding cultural differences. Yarmouth, Me.: Intercultural Press.
- Hofstede, Geert H.; Hofstede, Gert Jan; Minkov, Michael (2010): Cultures and organizations. Software of the mind: intercultural cooperation and its importance for survival. 3rd ed. New York: McGraw-Hill.
- Jandt, Fred Edmund (2013): An introduction to intercultural communication. Identities in a global community. 7th ed. Thousand Oaks, Calif.: Sage Publications.
- Moran, Robert T.; Abramson, Neil R.; Moran, Sarah V. (2014): Managing cultural differences. 9. ed. London, New York: Routledge.
- Samovar, Larry A.; Porter, Richard E.; McDaniel, Edwin R. (Hg.) (2014): Intercultural communication. A reader. 14th edition. Wadsworth.
- St. Amant, Kirk; Kelsey, Sigrid (2012): Computer-mediated communication across cultures. International interactions in online environments. Hershey, PA: Information Science Reference.

Course

Lecturer	**Title**	**SPPW**
Prof. Maria Krüger-Basener	Communication and Culture	4

2.4 Computer Sciences (Winter semester)

Lecturer in charge:	Prof. Dr. Rüdiger Götting
Form:	Seminar form lecture, exercises
Type:	Mandatory module
Prerequisite for participation:	
Applicability of the module:	MaMb
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Project Work (P) including a Computer Program (DV)
ECTS:	5

Competences

By completing this course, students are able to implement complex project using standard libraries.
Moreover, the students understand standard paradigms in creating GUIs and implementing multi-thread applications. They comprehend object oriented paradigms and make use of standard methods in object oriented software-systems. The students are able to develop an application using an ide.

Content

The course contents might be summarized by four topics:

- Advanced concepts of a higher language
- Frameworks
- design patterns
- software development using an ide

Literature

- J. T. Streib, T. Soma: Guide to Java; Springer Verlag, 2014
- Lars Vogel: Eclipse IDE: Eclipse IDE based on Eclipse 4.2 and 4.3. vogella series.; 2013
- Lecture notes

Course

Lecturer	Title	SPPW
Prof. Dr. Rüdiger Götting	Computer Sciences	4

2.5 Introductory Futures Studies for Engineers (Summer semester)

Lecturer in charge:	M. Phil. Dipl.-Ing. Karl Christoph Keller
Form:	The students prepare topics from different perspectives. Through discussion a holistic view will be developed. Students complete exercises in quantitative and qualitative approaches.
Type:	Mandatory module
Prerequisite for participation:	
Applicability of the module:	MaMb
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Project Work (P)
ECTS:	5

Competences

The students are aware of concepts, approaches and methods:

- reflect the opportunities and risks of recent scientific-technical developments and the associated social, economic, and ecological developments
- examine the economic, political, environmental, and general societal conditions connected with the realization and implementation of scientific-technical developments
- anticipate the potential effects and benefits of scientific-technical developments and to demonstrate the possibilities of a strategic utilization of the opportunities the application of a technique could bring as well as for the prevention or mitigation of its risks

Content

Besides an introduction to futures studies with a focus on technology, exemplary quantitative and qualitative methods from futures studies and Technology Assessment (e.g. Environmental Scanning, Trend-Analysis, Technology Forecasting, Expert elicitation (e.g. Interviews, Delphi), risk analysis, cost-benefit analysis, and scenario techniques) will be presented. The special methodical challenges of studying the future will be discussed.

Literature

- Alan Thomas Roper, Scott W. Cunningham, Alan L. Porter, Thomas W. Mason, Frederick A. Rossini, Jerry Banks: Forecasting and Management of Technology, Second Edition. 2011. John Wiley & Sons
- Edward Cornish: Futuring: The Exploration of the Future. 2004. World Future Society
- Dirk Proske: Catalogue of Risks: Natural, Technical, Social and Health Risks. 2008. Springer
- Jamshid Gharajedaghi: Systems Thinking: Managing Chaos and Complexity: A Platform for Designing Business Architecture, Third Edition. 2011. Butterworth-Heinemann
- Lecture notes

Course

Lecturer	**Title**	**SPPW**
M.Phil. Dipl.-Ing. Karl Christoph Keller	Introductory Futures Studies for Engineers	4

2.6 Marketing (Summer semester)

Lecturer in charge:	Prof. Dr. Henning Hummels
Form:	Lecture, exercise class
Type:	Mandatory module
Prerequisite for participation:	
Applicability of the module:	MaBM
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Case Study, Written exam (K1)
ECTS:	5

Competences

The students acquire a critical understanding of the most important theories, principles, and methods of modern Marketing. They are enabled to appraise and judge unknown issues with relevance to Marketing, and apply and make decisions about marketing instruments, e.g. the Ansoff matrix or the BCG product portfolio model in unknown and complex contexts. The underlying knowledge reflects the state-of-the-art in literature and research, and delves into selected fields of expertise. The students are able to critically discuss Marketing issues and to expand their knowledge base independently.

All contents are being illustrated by using up-to-date examples from both consumer and industrial goods markets. Exercises displaying short case studies allow for an application of learned contents to real life scenarios. At the end of the semester, a business simulation will be played. This way all marketing instruments will not only be considered in an isolated way, but their integrated application and interconnected effects in complex situations will be experienced and practiced.

Content

Love and respect your customer! The general meaning of Marketing for companies in a modern, interconnected, and globalized business world is at the beginning of the course. Students will understand that the customers are at the center of all corporate activities.

In order to reach this, after fundamental definitions an introduction to customer behavior on both consumer and industrial markets will be delivered. Principles and methods of market research will be treated to analyze this behavior. Based on this, the fundamentals of strategic marketing planning that define the corridor of corporate activities will be developed. This leads to a detailed examination of the elements of the marketing mix, i.e. product, pricing, distribution, and communication policy.

Product policy involves the concept of the product life cycle and furthermore deals with innovation and product modification processes as well as the management of brands and product assortments. Pricing policy focusses on cost, competition, and demand based pricing and also touches on dynamic pricing over time. All alternatives of direct and indirect distribution are at the core of distribution policy whereas communication policy deals with the entire range of classic and modern communication instruments. The concept of the customer journey integrates both.

Literature

- Jobber, David: Principles and Practice of Marketing. McGrawHill, latest edition.

Course

Lecturer	**Title**	**SPPW**
Prof. Dr. Henning Hummels	Marketing	4

2.7 Master Thesis

Lecturer in charge:	Prof. Dr. Elmar Wings
Form:	To a large extent independent development of a problem and supervision.
Type:	Mandatory module
Contact-Time (h):	90
Self-Study-Time (h):	810
Exam:	Scientific report, Master thesis with Colloquium
ECTS:	30

Competences

The students are able to work on a given problem. They are able to explore the current scientific literature independently and draw conclusions.
In doing so, they apply their acquired knowledge and develop goal-oriented solutions within the framework of their Master's thesis. They have in-depth knowledge in the field of project management and can apply this knowledge adequately in scientific projects.

Content

Current topics within the field of Technical Management including

- technical deepening or one of the deepening within the department of technical engineering
- Independent acquisition of a subject with the help of technical literature and other sources
- Layout of verbal presentations and written scientific papers with the potential for scientific publication.

Literature

- Guide to Writing a Seminar Paper; Göx, Robert
- Special literature concerning the topic

Course

Lecturer	**Title**	**SPPW**
Prof. Dr. Kathrin Ottink	Introduction to Scientific Working	2
Lecturer of the study course	Master Thesis	

3. Elective Modules

3.1 Advanced Project Management for Engineers (Winter/summer semester)

Lecturer in charge:	Prof. Dr. Andreas Haja
Form:	lecture, group discussion, case studies
Type:	Elective module
Prerequisite for participation:	
Applicability of the module:	MaMb
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Written exam (K2) or Oral exam (M) or Report (R)
ECTS:	5

Competences

Students are able to apply the main tasks of a project manager and practical methods for project planning and implementation. Students gain experience in the limits and possibilities of project management through practical exercises of selected methods and instruments. Furthermore, the creation of freedom of movement and space within a project is included as risk management.

Content

- Structuring projects, planning of time, resources and costs
- load diagrams, fast tracking, controlling of time
- costs and milestones, reaction to changes
- and disruptions, risk analysis

Literature

- Lecture notes

Course

Lecturer	Title	SPPW
Prof. Dr. Andreas Haja	Applied Project Management	4

3.2 Controlling (Winter semester)

Lecturer in charge:	Prof. Dr. Carsten Wilken
Form:	Seminar form lecture, exercises
Type:	Elective module
Prerequisite for participation:	
Applicability of the module:	MaMC
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Written exam **(**K2)
ECTS:	5

Competences

After having visited this lecture, students will be able to fulfill the main accounting-related tasks of Engineers in technical organizations, such as planning and control. Among others, they will be able to:

- Plan capital investments and evaluate investments proposals
- Submit yearly budgets for your area of responsibility and interpret reports about it
- In case of plan-to-actual deviations, analyze any reasons for this deviation
- Cost products and interpret product-costings.

In addition to this, the students will know how different costing-systems will affect key ratios of work and how that influences decision control. Thus, they will be able to use systems and values of internal accounting for decision making and decision control, and they will be able to evaluate existing procedures of companies.

Content

- Fundamentals of Accounting
- Accounting for decision making and control
- Values and reports of Accounting
- Planning of Capital Investments
- Budgeting
- Product Costing
- Cost Allocation
- Systems of Cost Accounting (Absorption Costing, Variable Costing, Standard Costing)
- Variance Analysis

Literature

- Horngren, C.; Datar, S.; Foster, G.; Rajan, M.; Ittner, C.: /Foster: Cost Accounting – A Managerial Approach
- Zimmerman, J.: Accounting for Decision Making and Control; McGraw Hill

Course

Lecturer	**Title**	**SPPW**
Prof. Dr. Carsten Wilken	Controlling	4

3.3 ERP- Systems (Winter/summer semester)

Lecturer in charge:	Prof. Dr.-Ing. Agnes Pechmann
Form:	Lecture, practical exercises, student work and presentations, case study or serious games
Type:	Elective module
Prerequisite for participation:	
Applicability of the module:	MaMb
Contact Time (h):	45-60
Self-Study-Time (h):	90-105
Exam:	Written (K2) or Project Work (P) with Report(R) and Presentation
ECTS:	5

Competences

After attending the module, students are able to understand, follow and apply the basic functions of ERP systems. Different concepts and approaches for the technical and conceptual architecture of these systems are identified and evaluated for their practical use. Students will be able to specify business requirements for typical companies and how they are met by different systems.

Content

The following topics are provided in this module: computer sciences

- ERP-Basics
- Architecture of ERP-Systems
- Typical business processes in ERP-Systems focusing on production
- Applying an ERP-System in a company realistic environment (case study or serious games)

Literature

- SAP S/4HANA Learning Material
- Literature based on students' literature review

Course

Lecturer	Title	SPPW
Prof. Dr.-Ing. Agnes Pechmann	ERP-Systems	4

3.4 Energy Engineering (Summer semester)

Lecturer in charge:	Prof. Dr.-Ing. Oliver Böcker
Form:	Seminar form lecture, exercises
Type:	Elective module
Prerequisite for participation:	
Applicability of the module:	MaMb
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Written exam **(**K2**)**
ECTS:	5

Competences

Students know the different types of power plants and understand their function. This includes understanding the various primary energy sources and the conversion processes to useable energy. Next they are capable to select the best process and the right device or engine, depending on the available energy source. Students can divide the power plants according to their efficiency, carbon dioxide emissions, energy density and rate. They can describe, analyze and compare the different steps of the conversion of primary energy to electrical energy.

Content

- Primary energy sources
- Energy conversion processes
- Functionality of power stations like for example wind energy plant, solar heat plants, hydropower plants or coal fired power stations

Literature

- Michaelides, Efstathios E.: Alternative energy sources
- Dincer, Ibrahim; Zamfirescu, Calin: Advanced power generation systems
- Turns, Stephen R.: Thermodynamics

Course

Lecturer	**Title**	**SPPW**
Prof. Dr.-Ing. Oliver Böcker	Energy Engineering	4

3.5 Innovation Management (According to demand, Summer semester)

Lecturer in charge:	Prof. Dr. Andreas Haja
Form:	Lecture, case studies
Type:	Elective module
Prerequisite for participation:	
Applicability of the module:	MaMb
Contact-Time (h):	36
Self-Study-Time (h):	54
Exam:	Report (R)
ECTS:	5

Competences

Students are able to explain the significance of an innovation process as the pipeline for new products in business. They can describe typical development stages of engineering projects. The students have gained experience in teamwork and presentation techniques in practical phases and can apply them.
They can work on tasks in self-study under supervision and on their own responsibility. The high degree of self-study is didactically supported by homework.

Content

Innovation is one of the driving factors of business success. This module conveys in-depth knowledge on modern innovation techniques used in engineering projects and lets students create and present their very own technical innovations.

The lecture conveys knowledge on:

- innovation pipeline in engineering projects
- Idea and knowledge management
- Creativity techniques,
- Patents and intellectual property
- Software tools for knowledge and idea management

Literature

- Harvard Business Review: HBR's 10 Must Reads on Innovation; Harvard Business Review Press, 2013
- Trott, P.: Innovation Management and New Product Development, 5th edition; Prentice Hall, 2011
- Dodgson, M. / Gann, D.: The Oxford Handbook of Innovation Management; Oxford University Press, 2014

Course

Lecturer	**Title**	**SPPW**
Prof. Dr. Andreas Haja	Innovation Management	2

3.6 Intelligent Automation (According to demand, Summer semester)

Lecturer in charge:	Prof. Dr. Elmar Wings
Form:	Lecture
Type:	Elective module
Prerequisite for participation:	
Applicability of the module:	MaMb
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Written exam (K2)
ECTS:	5

Competences

The students have knowledge in the application areas of different manufacturing concepts and in flexibility in product and automation engineering. Furthermore, they are familiar with innovative manufacturing according to the reference architecture model Industry 4.0.

The course brings together diverse disciplines in a comprehensive manner. Students are able to integrate interdisciplinary perspectives and use them for one topic. They are able to organize their learning in a team within the framework of projects.

Content

This session follows an integrated study approach; therefore the students use and extend their knowledge in the areas:

- production-systems
- automation-systems
- information-systems in the production
- production control and management
- functions of supply-chains

Literature

- Wang, L. and Nee, A.: Collaborative Design and Planning for Digital Manufacturing, Springer Verlag London. 2009.
- Benyoucef, L. and Grabot, B.: Artificial Intelligence Techniques for Networked Manufacturing Enterprises Management, Springer Verlag London. 2010.

Course

Lecturer	**Title**	**SPPW**
Prof. Dr. Elmar Wings	Intelligent Automation	4

3.7 International Commercial Law (Winter semester)

Lecturer in charge:	Dr. Bernd Bessau
Form:	seminar
Type:	Elective module
Prerequisite for participation:	
Applicability of the module:	MaBM
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Written exam (K2)
ECTS:	5

Competences

Students master the basics of legal thinking and discuss them using selected practical examples. They can reflect on the legal background of their own professional activities as engineers and managers as a prerequisite for successful cooperation with legal experts. They can also improve their communication skills.
Students will have an overview of general legal foundations, contract law, international contracts and insights into different legal systems. In order to support the high degree of self-learning didactically, the students have to work on a seminar paper on a field of law in the course of the course and present it in a presentation. There is a broad catalogue of topics for this purpose - e.g. insolvency law in a particular country, European insolvency law - similarly then for company law etc. This requires independent work on the chosen topic. As each student presents his or her topic, all participants will get a broad overview of International Commercial Law and there will be a series of comparisons of different legal systems.

Content

- Foundations of law (fundamental rights and freedoms, rule of law)
- Sources of law (agreement, statute, custom)
- Selected legal topics (due diligence, liability, standardization, proportionality, precaution, security, penalties)
- Hierarchy and interaction of national, European and international law
- Commercial law (EC/EU, WTO)
- Law of technology, technical installations
- Energy and sustainable development

Literature

- Case studies
- Lecture notes

Course

Lecturer	**Title**	**SPPW**
Dr. Bernd Bessau	International Commercial Law	2

3.8 Negotiation & Leadership (According to demand, Summer semester)

Lecturer in charge:	Prof. Dr. Olaf Passenheim
Form:	The seminar is based on the assessment-center principle. Short presentations of the participants, work in peers and in stressful environment will be provided in using the Hot Seat.
Type:	Elective module
Prerequisite for participation:	
Applicability of the module:	MaBM
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Oral **(**M) exam, Written exam (K)
ECTS:	5

Competences

The importance of leadership is recognised by the importance of effective management skills to maintain and enhance reputation. Management skills are required in addition to academic, research skills.

Students know the theoretical background of leadership and negotiation in the context of competencies. Students are able to work in a self-organized and reflexive manner and know their individual competencies. Graduates of the program know their strengths in both positive and stressful situations with a focus on management and negotiation situations and know how to develop and use them.

Content

The internationally acknowledge approach KODE® diagnostic system to systematically identify the individual competencies will be applied. KODE® is a procedural system with an international trademark (Germany, Austria, Switzerland). In German, KODE® stands for Kompetenz-Diagnostik und -Entwicklung (The diagnosis and development of competencies). Its main emphasis is on the development of competencies. The assessment of the existing 'competencies in terms of certain requirements of everyday professional life' ('skills for ...') is a means for the purpose of developing and/or strengthening competencies. Competencies are the ability to act and react in a self-organized, creative way in the face of new, non-predictable, open situations.

Competencies are backed up by knowledge, constructed by values and norms, individualized by internalization, consolidated by experiences and realized on the basis of will.

Literature

- KODE diagnostic system
- Lecture notes

Course

Lecturer	**Title**	**SPPW**
Prof. Dr. Passenheim	Negotiation & Leadership	4

3.9 Production Systems (Winter semester)

Lecturer in charge:	Prof. Dr.-Ing. Thomas Schüning
Form:	Seminar form lecture
Type:	Elective module
Prerequisite for participation:	
Applicability of the module:	MaMb
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Written exam (K2)
ECTS:	5

Competences

Students acquire basic knowledge about the essential production strategies and manufacturing possibilities for the economical production of products in SMEs and industries. For defined production tasks they can use and evaluate the basic process systems and develop specific process chains. Students are able to select the production possibilities of tools / equipment and production units from an economic point of internal and external production.

Content

- Comparison of production systems for the manufacturing of technical products
- Development of process chains from planning to the finished product
- Selection of appropriate production facilities (e.g. forming, cutting, joining, heat treatment) to specific manufacturing tasks
- Learning about modern flexible manufacturing technologies (e.g. laser), production of prototypes, individual parts and regeneration of components by additive process
- Economic evaluation of the process over the entire process chain.

Literature

- Fritz, A. H., Schulze, G.: “Fertigungstechnik“, Springer Verlag
- Dubbel, H.: “Taschenbuch für den Maschinenbau“, Springer Verlag
- Eichler,J., Eichler H.J.:“Laser“ ,Springer Verlag

Course

Lecturer	**Title**	**SPPW**
Prof. Dr.-Ing. Thomas Schüning	Production Systems	4

3.10 Quality Management (Winter semester)

Lecturer in charge:	Prof. Dr.-Ing. Werner Kiehl
Form:	- seminar form lectures - presentations and papers (acquired by the students according to given conditions) - occasionally role plays according to the topic of QM
Type:	Elective module
Prerequisite for participation:	
Applicability of the module:	MaMb
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Report (R) and Oral exam (M)
ECTS:	5

Competences

Students understand the importance of quality management and can assess the potential of QM-oriented approaches. They also understand QM philosophies and QM-oriented thinking and are familiar with QM methods and tools. They are familiar with team-oriented working methods and overarching thinking. In addition, they should be able to structure, document and implement customer-oriented working methods.

Content

- Introduction
- Development and History of QM
- QM philosophies
- ISO 9000 and extended Approaches
- QM Tools and Methods in R&D and Production
- Problem solving Tools
- Improvement Methods
- Management Tools

Literature

- Gryna, F.M.: Juran's quality planning & analysis Boston (MA): McGraw-Hill, 2007
- Masing, W.: Handbuch des Qualitätsmanagements - 6. Auflage München: Hanser, 2014
- Linß, G.: Qualitätsmanagement für Ingenieure - 3. Auflage, München: Fachbuchverlag Leipzig in Hanser, 2011
- Pfeifer, T.: Quality management: strategies, methods, techniques - 3rd edition - München: Hanser, 2002
- Hering, E.: Qualitätsmanagement für Ingenieure -5. Auflage- Berlin: Springer, 2003
- Juran, J.M.: Juran's Quality Handbook - 6th edition - New York (NY): McGraw-Hill, 2010
- DIN EN ISO 9000:2015 and related standards
- SA8000; SCC, OHSAS 18001
- actual developments and subjects: Internet

Course

Lecturer	Title	SPPW
Prof. Dr.-Ing. Werner Kiehl	Quality Management	4

3.11 Strategic Management (According to demand, Winter/Summer semester)

Lecturer in charge:	Prof. Dr. Olaf Passenheim
Form:	Lecture with case study and plenum presentation
Type:	Elective module
Prerequisite for participation:	
Applicability of the module:	MaBM
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Project Work **(**P), Report (R), Written exam (K) The students have to write a report for a case study on strategic management or develop a case study on strategic management in small groups
ECTS:	5

Competences

The importance of strategic management in a global context is brought into the students' focus. In rapidly changing markets with complex and dynamic settings, the strategy process is not only a success-oriented but also a sustainable and socially acceptable management approach. Students know the different approaches to developing a strategy. Independently and in groups, the participants can analyse strategic decisions in the context of the requirements of a global environment, identify strengths and weaknesses and make and defend their own (strategic) decisions.

Content

The course is divided into three parts: In the first part, the participants deal with issues of sustainable, responsible and competitive strategic positioning and profiling of companies and business units in a (global) market environment. They will understand various theoretical approaches and the implementation opportunities of strategic management in its international context. In the second part, students apply the learned process steps of a strategy development through case studies. Besides understanding and seeing the starting point of a strategic process, participants will analyze, discuss and evaluate different strategic options and their implementation as a management task. Additionally, students will discuss and consider the implications and influences of strategic decisions by the country and corporate culture. At the end of the semester, students will be able to develop their own small case study about a strategic issue.

Literature

- Supporting Case Studies (Harvard Business Cases)
- Porter, M.E.: What is Strategy; in: Harvard Business Review; Nov.-Dec. 1996; S. 61-78; 1996.
- Porter, M. E./ Kramer, M. R.: Creating Shared Value. How to reinvent capitalism - and unleash a wave of innovation and growth; in: Harvard Business Review, January-February 2011, S. 62-77.
- Mintzberg, H. / Ahlstrand, B. / Lampel, J.: Strategy Safari: A Guided Tour through the Wilds of Strategic Management. Free Press 2005
- Porter, M.: Competitive Strategy. Techniques for Analyzing Industries and Competitors, Simon & Schuster 2004

Course

Lecturer	**Title**	**SPPW**
Prof. Dr. Olaf Passenheim	Strategic Management	4

3.12 Modeling and Simulation (Winter semester)

Lecturer in charge:	Prof. Dr. Matthias Graf
Form:	Lecture, seminar, exercise
Type:	Elective module
Prerequisite for participation:	
Applicability of the module:	MaMb
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Oral (M) or written exam (K2)
ECTS:	5

Competences

The students can choose appropriate approaches of models for different applications in constructive mechanical engineering. They know available simulation environments and hardware requirements. They gain basis for management decision-making whether a required modeling and simulation is better set up "in house" or procurement to specialized partner company is a good choice. Students can check existing simulation results and can evaluate how far the simulation result provides a sufficient basis for economic/constructive decision-making. They can simulate models of one approach (e.g. FEA) and develop them further.

Content

- Definition of "system", "model" and "simulation"
- Modeling approaches, their requirements, potentials and weaknesses (FEA, MBS, particle methods, SEA, cellular automata, differential equations)
- Required software and hardware
- Advantages/Disadvantages of "in house"-simulation departments and collaboration with simulation service companies
- Techniques for result verification
- Basis functionalities of one simulation environment (e.g. Abaqus)

Literature

- Hans-Joachim Bungartz, Stefan Zimmer, Martin Buchholz, Dirk Pflüger: Modeling and Simulation: An application-oriented introduction, Springer 2014
- Louis G. Birta, Gilbert Arbez: Modeling and Simulation – Exploring Dynamic System Behaviour, Springer, 2019

Course

Lecturer	Title	SPPW
Prof. Dr. Matthias Graf	Modeling and Simulation	4

3.13 TM-Project

Lecturer in charge:	Degree program's coordinator
Form:	Solving of a problem independently under the guidance of a supervisor, presentation and discussion of the results preparation of a project report
Type:	Elective module
Contact-Time (h):	30
Self-Study-Time (h):	120
Exam:	Report (R)
ECTS:	5

Competences

Students are able to independently solve a comprehensive problem in the field of technical management in a scientifically sound manner using the knowledge and techniques acquired.

Content

The topic/problem can be proposed by the examinee but has to be approved by the examiner/supervisor.

Literature

- Project dependent literature

Course

Lecturer	**SPPW**
University lecturer of the study course	4