



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: 2019)

Table of Content

1. Overview	3
1.1 Introduction	4
1.2 Module structure.....	5
1.3 General Definitions	6
1.4 Abbreviations	7
2. Mandatory Modules	8
2.1 Applied Statistics.....	9
2.2 Business Management.....	10
2.3 Communication & Culture	11
2.4 Computer Sciences	12
2.5 Introductory Futures Studies for Engineers.....	13
2.6 Marketing	14
2.7 Master Thesis	15
3. Elective Modules.....	16
3.1 Advanced Project Management for Engineers (<i>according to demand, only winter semester</i>) 17	
3.2 Computer Aided Geometric Design (CAGD) (<i>according to demand</i>).....	18
3.3 Controlling.....	19
3.4 ERP- Systems	20
3.5 Energy Engineering.....	21
3.6 Innovation Management.....	22
3.7 Intelligent Automation (<i>according to demand</i>).....	23
3.8 International Commercial Law	24
3.9 Negotiation & Leadership	25
3.10 Production Systems	26
3.11 Quality Management	27
3.12 Strategic Management (<i>according to demand</i>)	28
3.13 TM-Project	29

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
- Economic competences such as an introduction to the fundamentals of Economy, Law and diverse aspects of management
- Professionalization

The introductory modules in the fields of Soft Skills 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 studies and to keep up with the learning goals.

Courses such as international commercial law, combining legal thinking and the fundamentals of law, enhance skills in arbitrations and follows up with the globalization of the market. Furthermore, communication skills of the students are optimized, during the Soft skills and Business modules, to strengthen the international professional scope and prepare for an effective communication in global business transactions. What is more, lectures such as Marketing, are strongly customer related and focus on critical understanding of the topic and evaluating for example business' strengths. The course Quality Management enhances student's views on organizational efficiency, customer satisfactory and financial performance.

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*	Technical Module**	Applied Statistics*	Soft Skill Module**	Business Management*	Business Module**	30 ECTS	2./1. Semester
5 ECTS	5 ECTS	5 ECTS	5 ECTS	5 ECTS	5 ECTS		
Introductory Future Studies for Engineers*	Technical Module**	Communication & Culture*	Soft Skill Module**	Marketing*	Business Module**	30 ECTS	1./2. Semester
5 ECTS	5 ECTS	5 ECTS	5 ECTS	5 ECTS	5 ECTS		

Legend: * Mandatory module ** Elective module

Technical Modules	Professionalization	Business Modules
<ul style="list-style-type: none"> • Computer Sciences • Introductory Future Studies for Engineers • Advanced Materials • Computer Aided Geometric Design • Energy Engineering • Intelligent Automation • Production Systems • “Recent Topic” • Project 	<ul style="list-style-type: none"> • Communication & Culture • Applied Statistics • Advanced Project Management for Engineers • Innovation Management • Leadership & Negotiation • Quality Management 	<ul style="list-style-type: none"> • 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.
- 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.

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 Applied Statistics

Lecturer in charge:	Prof. Dr. Elmar Wings
Form:	Lectures, exercises, case studies
Type:	Mandatory module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	written (K2) exam
ECTS:	5

Competences

The students gain an insight in the different methods to prepare and to present static data. They will be able to understand and to interpret diagrams, tables, frequency distributions, statistical measures and indexes. Moreover, they will get to know the differences between one-dimensional and two-dimensional features. A statistical study in a company will be carried out independently. Furthermore, the students will be able to prepare the results graphically and in table form and interpret it comprehensively. Finally, they will be skilled in analyzing the basic material and can transform the results into understandable reports. Finally, the students will have the ability to verify hypotheses. Students will learn how to use data. They can evaluate data and they can interpret and communicate the results. They are able to verify hypotheses and to estimate parameters. Students are able to justify their decisions by means of statistical methods and analysis.

Students will:

- carry out data collections and can differentiate characteristics by the scale
- know how the absolute and the relative frequencies are defined and can draw up frequency tables
- calculate statistical measures and indexes
- carry out a simple regression analysis and can calculate key figures
- recognize a time series and calculate the most important parameters
- verify hypothesis with statistical methods of testing and can estimate parameters
- calculate simple key figures by means of statistic software

Content

- Principles of data classification and data collection
- One-dimensional features of distributions and their graphic representation
- Two-dimensional features & regression analysis
- Measurements and index values
- Elementary time series analysis concerning trend determination estimation of components
- Random variables and distributions
- Estimation and testing procedures
- Analysis of economic data using statistics software

Literature

- Liengme, B.: A Guide to Microsoft Excel 2013 for Scientists and Engineers; Elsevier 2015
- Ross, S.: Introduction to Probability and Statistics for Engineers and Scientists, 5th Edition; Elsevier 2014
- Siegel, A.: Practical Business Statistics, 7th Edition; Elsevier 2016

Course

Lecturer	Title	SPPW
Prof. Dr. Elmar Wings	Applied Statistics	4

2.2 Business Management

Lecturer in charge:	Prof. Dr. Olaf Passenheim
Form:	Lecture with case study and plenum presentation, block seminar business simulation game
Type:	Mandatory module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	written (K2) exam, oral (M) exam
ECTS:	5

Competences

Participants will understand basic requirements and challenges for running a company in the domestic or international market from the management perspective. Participants will be able to identify and analyze various organizational forms of business and know their advantages and disadvantages. By discussing contemporary short business cases, students in addition will be familiar with understanding the main theories and impact of ethical, sustainable and social requirements on a company. In the last third of the course, the students are familiarized with the challenges of human resource management.

- 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

Lecturer in charge:	Prof. Maria Krüger-Basener
Form:	Lecture and Seminar in combination
Type:	Mandatory module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Oral (Case Studies (M 30 min)) or Written (Case Studies (K 90 min))
ECTS:	5

Competences

Students will get to 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

Lecturer in charge:	Prof. Dr. Rüdiger Götting
Form:	Seminar form lecture, exercises
Type:	Mandatory module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Project (P) work including a computer (DV) program
ECTS:	5

Competences

By completing this course, students will be able to implement complex project using standard libraries.

Moreover, the students will understand standard paradigms in creating GUIs and implementing multi-thread applications. They will 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

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
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Project work (P)
ECTS:	5

Competences

The students shall be introduced to concepts, approaches and methods - in order to:

- 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

Lecturer in charge:	Prof. Dr. Henning Hummels
Form:	Lecture, exercise class
Type:	Mandatory module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Case Study, written (K1) exam
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:	28

Competences

The students independently explore scientific literature and draw consequences for their own work. They apply their compiled knowledge and work goal-oriented to solve the problems within the scope of their master thesis. Besides professional competence the ability for managing project will be enhanced by defined tasks within their master thesis. This enables the graduates to become competent in project management.

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 *(according to demand, only winter semester)*

Lecturer in charge:	Prof. Dr. Andreas Haja
Form:	lecture, group discussion, case studies
Type:	Elective module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Written (K2) exam or oral (M) examination or report (R)
ECTS:	5

Competences

Students will get in depth knowledge of the main tasks of a project manager and gain an insight in the approved praxis related methods of project planning and project execution. They will experience limits and chances of project management and obtain practical exercises in handling selected methods and instruments (teamwork). Finally, the students will create leeway and free space within projects to face disruption in a proactive way.

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 Computer Aided Geometric Design (CAGD) *(according to demand)*

Lecturer in charge:	Prof. Dr. Elmar Wings
Form:	Seminar
Type:	Elective module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Project (P) work and report (R)
ECTS:	5

Competences

Students get an insight in how a CAD program is designed, thus, they are familiar with the numerical methods of CAGD (Computer Aided Geometrical Design). This puts them in a position to process even complex modeling tasks effectively. In particular, they get familiar with the parametric modeling, the automatic data import and the modeling of freeform surfaces. These skills allow them, to effectively implement improvement projects in the use of CAD. Students will get to know, that a CAD model for a computer simulation is significantly different from a production model, if the subsequent networking and simulation process will be effectively controlled.

The skills of CAGD are taught by carrying out the following exercises:

- Mathematical relationships for NURBS
- structure of a CAD program
- Principle of parametrizing
- contents of interfaces : IGES, STEP , STL
- types and content of CAD interfaces
- Parametric modeling with automated data import
- modeling of freeform surfaces

Content

CAD tool is a program package in the chain of development of a product that is responsible for the most intense quality, productivity and innovation of a product. Modern CAD programs increasingly integrate easily by importing data from calculation programs and export of simulation programs in the product development process.

Literature

- Kuang-Hua Chang: e-Design, Elsevier; 2015
- Gerald E. Farin, Josef Hoschek, Myung-Soo Kim: Handbook of Computer Aided Geometric Design; Elsevier, 2002
- Les Piegl, Wayne Tiller: The NURBS Book, Springer Science & Business Media; 1997

Course

Lecturer	Title	SPPW
Prof. Dr. Elmar Wings	Computer Aided Geometric Design (CAGD)	4

3.3 Controlling

Lecturer in charge:	Prof. Dr. Carsten Wilken
Form:	Seminar form lecture, exercises
Type:	Elective module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Written (K2) exam
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

3.4 ERP- Systems

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

Competences

Students are able to understand, follow up and apply basic functions of ERP-systems. Different concepts and approaches for technical and conceptual architecture of these systems will be identified and evaluated for their practical employment. Students can be specify business requiremets for typical businesses and their fulfillment 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

3.5 Energy Engineering

Lecturer in charge:	Prof. Dr.-Ing. Oliver Böcker
Form:	Seminar form lecture, exercises
Type:	Elective module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Written (K2) exam
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, Efsthios 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

3.6 Innovation Management

Lecturer in charge:	Prof. Dr. Andreas Haja
Form:	Lecture, case studies
Type:	Elective module
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.

Students are proficient in using techniques for creating new ideas and are able to present them in a structured and convincing way. Students gather experience in team work and presentation skills.

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

3.7 Intelligent Automation *(according to demand)*

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

Competences

Students will gain knowledge in the areas of applications in various manufacturing concepts and in flexibility in productions- and automation engineering. Additionally, they will become acquainted with innovative manufacturing according the reference architecture model industry 4.0.

The course brings together diverse disciplines in a comprehensive manner, enabling students to develop a meaningful understanding of the complex associations and influences within a topic, thus project-based learning is an essential element.

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

3.8 International Commercial Law

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

Competences

Students shall get accustomed to the basic lines of legal thinking and discuss those against the background of selected examples from legal practice. Doing so, students shall experience the legal dimension attributed to their own professional activities as engineers and managers as a necessary precondition of any successful liaison with legal experts. In addition, students shall improve their communication skills.

The students get an overview of general legal bases, contract law, international contracts and insights into different legal systems. In order to teach the didactic part of the high proportion of self-study, the students have to prepare a term paper on a topic of a legal area. For this purpose, there is a broad thematic catalog, e.g. insolvency law in a particular country, European insolvency law - similar to corporate law, etc. This requires independent elaboration of the chosen subject. Since each student presents his / her topic, all participants receive a broad overview from the field of international commercial law and there are a number of comparisons of different legal orders.

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

3.9 Negotiation & Leadership

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
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Oral (M) exam, written exam
ECTS:	5

Competences

The importance of leadership is recognized by the importance of effective management skills to ensure and maintains one's reputation for excellence. Management skills are needed alongside academic, research skills.

- In the first part of the lecture students learn the theoretical background of leadership (and negotiations) in the context of competencies
- In the second part students will learn their individual (managerial) competencies and gain an understanding how to develop and use their strengths in positive as well as stressful situations with an emphasis on management & negotiation situations.

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

3.10 Production Systems

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

Competences

Students will 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

3.11 Quality Management

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
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	Report (R) and Oral (M) exam
ECTS:	5

Competences

Understanding the importance of Quality Management and estimating the potential of QM-oriented approaches. Understanding of QM philosophies and QM dominated thinking and becoming acquainted with QM methods and QM tools. Practice in team-oriented methods as well as deepening of comprehensive thinking. Furthermore, stabilization of structured, documented work approaches plus strengthening of customer-oriented work approach.

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

3.12 Strategic Management *(according to demand)*

Lecturer in charge:	Prof. Dr. Olaf Passenheim
Form:	Lecture with case study and plenum presentation
Type:	Elective module
Contact-Time (h):	60
Self-Study-Time (h):	90
Exam:	P, R, written exam 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 within the global context is brought into focus of the students. In rapidly changing markets with complex and dynamic settings, the strategy process is a success factor not only for a profit-oriented, but also sustainable and socially acceptable management approach. The students will learn the various approaches towards developing a strategy. Students learn independently and in groups to analyze strategic decisions in the context of the demands of a global environment, to identify strengths and weaknesses and to 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

3.13 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

Solving of comprehensive questions within the field of "Technical Management" through a scientific approach and the application of knowledge and skills that have been acquired so far are the goals for the TM-Project.

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
University lecturer of the study course

SPPW
4