



Module Guide

Bachelor

Industrial Engineering / Maintenance and Operation

Faculty European Campus Rottal-Inn (in foundation)

Examination regulations 01.10.2018

EB-01 Principles of Mathematics

module name	Principles of Mathematics
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS18
module history	
Creditpoints (ECTS)	5
Module number	EB-01
Module components (courses)	EB1101 Analytical Principles of Engineering
Responsible for module	Prof. Dr. rer. nat. Raimund Brotsack
major field of study	General
Duration of module exam in min.	90 minutes
Type of exam	GMPschr.
Module description	
Module level	
Grade weighting	5/210
Learning outcomes of this module:	<ul style="list-style-type: none"> • Solve a range of predictable or less predictable problems for Engineers and Scientists. • Apply mathematical methods for solving engineering applications • Learn basic mathematical solution methods needed throughout other courses the study-program.
Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	
Literature	See course description
Teaching and learning methods	Course teaching / exercises /tutorials / home work
Specialities (additional information)	No

course name	Analytical Principles of Engineering	
Module	Principles of Mathematics	
examination regulations	NuW-IE-B-WS18	
Course		
major field of study	General	
Semester	1	
Weekly semester hours	4	
Credit Points	5	
Winter- / Summersemester	WS	
Work load in hours	150 hours: Time of attendance: 67,5 h additional workload: 57,5 h Exam preparation: 25 h	
Course Code	EB1101	
Teaching Language	English	
Type of course		FWP - voluntary elective subject
		Core / optional compulsory subject
	X	compulsory subject
		PLV - accompanying course for internship
		SWP - compulsory elective subject
		Elective subject
Course lecturer	Ibrahim Bader	
Type of	Written examination 90 minutes	
Responsible for module	Prof. Dr. rer. nat. Raimund Brotsack	
Learning content of this course	<p>Basics: set theory, real numbers, complex numbers and vectors</p> <p>Systems of Linear Equations, Matrices and Determinants</p> <p>Sequences and Series of Real Numbers Functions with one real variable</p> <p>Curves and their Mathematical Representation</p> <p>Functions in more than variable Remarks on Functions in R^n</p>	

Literature	Gilbert Strang., Introduction to linear algebra / 4 th ed. Wellesley-Cambridge Press, c2009 Sterling K. Berberian, A first course in real analysis, Springer-Verlag, c1994 Berenstein, Roger Gay, Carlos A. Complex variables : an introduction, Springer-Verlag, c1991
Teaching and learning methods	Course teaching / exercises /tutorials / home work
Specialities (additional information)	

EB-02 Principles in Mathematics for Engineering

module name	Principles in Mathematics for Engineering
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS18
module history	
Creditpoints (ECTS)	5
Module number	EB-02
Module components (courses)	EB2101 Mathematics for Engineering
Responsible for module	Prof. Dr. rer. nat. Raimund Brotsack
major field of study	General
Duration of module exam in min.	90
Type of exam	GMPschr.
Module description	
Module level	
Grade weighting	5/210
Learning outcomes of this module:	<ul style="list-style-type: none"> ○ awareness of the basic concepts of theoretical mathematics and calculus ○ ability to apply mathematical tools like differential equations and integration for solving real life technical problems ○ be aware about using mathematical modelling in applied field of engineering and business
Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	
Literature	See course description
Teaching and learning methods	Course teaching / exercises / tutorials / home work
Specialities (additional information)	No

course name	Mathematics for Engineering
Module	Principles in Mathematics for Engineering
examination regulations	NuW-IE-B-WS18
Course history	
major field of study	General
Semester	2
Weekly semester hours	4
Credit Points	5
Winter- / Summersemester	SS
Work load in hours	150 hours: Time of attendance: 67,5 h Additional workload: 57,5 h Exam preparation: 25 h
Course Code	EB2101
Teaching Language	English
Type of course	FWP - voluntary elective subject
	Core / optional compulsory subject
	X compulsory subject
	PLV – accompanying course for internship
	SWP - compulsory elective subject
	Elective subject
Course lecturer	Ibrahim Bader
Type of exam	Written examination 90 minutes
Responsible for module	Prof. Dr. rer. nat. Raimund Brotsack
Learning content of this course	<ul style="list-style-type: none"> ○ Functions and Limits functions (in one variable) ○ Differentiation (functions in one variable) ○ Integration ○ Power Series ○ Basics of differential geometry for plane curves ○ Area calculation of plane regions (bounded by a number of curves) ○ Differentiation of functions with several variables ○ Optimization; the method of least squares ○ Multiple integrals (domain, region, area and volume integration) ○ Fourier-Series

Literature	<ul style="list-style-type: none">○ Dwivedi, A.P, Engineering mathematics, PHI Learning Private Limited , New Delhi 2015○ Harvey P. Greenspan, David J. Benney, Calculus: an introduction to applied mathematics, Breukelen Press, c1997○ Anton Howard, Calculus: with analytical geometry, 5th ed. Wiley 1995
Teaching and learning methods	Course teaching / exercises /tutorials / home work
Specialities (additional information)	no

EB-03 Informatics for Engineering

Module number	EB-03
Module name	Informatics for Engineering
Module components	EB1102 – Informatics 1 EB1103 – Informatic Exercises EB2102 – Informatics 2
Part of Curriculum	Bachelor Industrial Engineering / Maintenance and Operation
Responsible for module	Prof. Dr.-Ing. Stefan Götze
Lecturer	Prof. Dr.-Ing. Stefan Götze
Area of specialisation	General
Semester	1 + 2
Duration of module	2 Semesters
Frequency of module	Annual
Type of module	Compulsory
Weekly semester hours	8
Creditpoints (ECTS)	8
Work load	<ul style="list-style-type: none"> ○ 90h Attendance time ○ 90h Additional workload ○ 60h Exam preparation In total: 240h
Teaching Language	English
<p>Learning outcomes of this module:</p> <p>After completing the module Informatics for Engineering the students achieved the following learning outcomes of this module:</p> <p>Students will get an introduction to the history of information processing, principles of positional number systems such as the binary, octal, hexadecimal system and to the binary and Boolean algebra. In addition the architecture of computers and their peripheral devices are taught, as well as basics concerning Web technology, data protection and privacy. Familiarity with the PC and practical experience with office applications using spreadsheets or database tables will be imparted in exercises. In the second semester the students will become acquainted with software engineering and programming using a common programming language.</p> <p>In the module Informatics for Engineering the following competences should be achieved:</p> <p>Expertise: Students will become acquainted with computers and different applications that are common in industrial engineering. Thus they will be able to assess the capacity and the limitations of computers and related applications.</p>	

Method competences:

Students will learn how to work systematically and in a way engineers would do to solve problems. They will also learn how to break a problem into parts that can be handled and solved more easily.

Personal skills:

Working at a computer, especially the programming of computers, forces the user to think in a systematical and disciplined way. Students will learn how to deal with their own failing and imperfection.

Social skills:

Working at a common software development project teamwork skills will be gained or fostered, respectively.

Educational objectives of this module:

- Via prerequisites such as number systems, encoding, binary and Boolean algebra, database technology, principles of algorithms and programming a basic understanding of how data processing systems are working will be provided.
- Becoming acquainted with computer hardware and peripheral devices students thus will be enabled to judge on computer performance data. Topics of the lecture such as organization of software development projects or Internet/Web technology provide students for finding their point of view in and to give substantial input to discussions concerning operational information management.
- Introduction to macro and database programming should lower the threshold using applications available in the office to develop tools that would ease day to day work.

Entry requirements and recommended requirements	Basic knowledge of mathematics and science (according to completion of High School)
Usability of this module for this program of studies	This module enables the students to follow lectures on computer related topics such as "Production System Engineering", "Data Communication and Processing / Industry 4.0" or "Data and Signal Acquisition and Processing".
Usability of this module for other programs of studies	Informatics and information technologies are relevant in all fields of engineering science.
Teaching form	Course teaching / exercises / tutorials / home work
Use of media	White board / visualizer / projector / interactive EXCEL sheets / videos
Type of exam	Written module exam (GMPschr. 90min.)
Specialities (additional information)	-

Literature

Preliminary literature: -

Accompanying literature:

- J. Glenn Brookshear: Computer Science – An Overview; Pearson; 12th edition (April 11, 2014)
- Paul E. Ceruzzi: A History of Modern Computing (History of Computing); The MIT Press; 2nd edition (April 8, 2003)
- Matthew MacDonald: Excel 2013 - The Missing Manual; O'Reilly Media; 1st edition (April 2013)
- Matthew MacDonald: Access 2013 - The Missing Manual; O'Reilly Media; 1st edition (April 2013)
- Matthew MacDonald: HTML 5 - The Missing Manual; O'Reilly Media; 2nd edition (December 2013)

In-depth literature: -

Exercise books: -

Formulary: -

Module number	EB-03
Course name	EB1102 Informatics 1
Module component	Informatics in Engineering
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
Module coordinator	Prof. Dr.-Ing. Stefan Götze
Lecturers	Prof. Dr.-Ing. Stefan Götze
Area of specialisation	General
Semester	1
Duration of module	2 Semester
Frequency of module	Annual
Type of module	Compulsory
Niveau	Bachelor
Semester periods per week (SWS)	Lecture: 2 Tutorials: -
Creditpoints (ECTS)	2
Work load	<ul style="list-style-type: none"> ○ Time of attendance: 22,5 h ○ Additional workload: 27,5 h ○ Exam preparation: 10 h In total: 60h
Language of instruction:	English
Learning outcomes of this module:	
<p>After completing the module Informatics in Engineering the students achieved the following learning outcomes of this module:</p> <p>Students will get an introduction to the history of information processing, principles of positional number systems such as the binary, octal, hexadecimal system and to the binary and Boolean algebra. In addition the architecture of computers and their peripheral devices are taught, as well as basics concerning Web technology, data protection and privacy.</p> <p>In the module Informatics in Engineering the following competences should be achieved:</p> <p>Expertise: Students will become acquainted with computers and the underlying concepts. Thus they will be able to assess the capacity and the limitations of computers and related applications.</p> <p>Method competences: Students will learn how to deal with different number systems that are common in informatics.</p> <p>Personal skills: - Social skills: -</p>	
Educational objectives of this module:	
<ul style="list-style-type: none"> ○ Via prerequisites such as number systems, encoding, binary and Boolean algebra, database technology, principles of algorithms and programming a basic understanding of how data processing systems are working will be provided. ○ Becoming acquainted with computer hardware and peripheral devices students thus will be enabled to judge on computer performance data. Topics of the lecture such as organization of software development projects or Internet/Web technology provide students for finding their point of view in and to give substantial input to discussions concerning operational information management. 	

Entry requirements and recommended requirements	Basic knowledge of mathematics and science (according to completion of High School)
Usability of this module for this program of studies	This module enables the students to follow lectures on computer related topics such as "Production System Engineering", "Data Communication and Processing / Industry 4.0" or "Data and Signal Acquisition and Processing"
Usability of this module for other programs of studies	Informatics and information technologies are relevant in all fields of engineering science.
Teaching form	Course teaching / exercises /tutorials / home work
Use of media	White board / visualizer / projector / interactive EXCEL sheets / videos
Duration of examination	90 minutes
Type of examination	Written module exam (GMPschr. 90min.)
Entrance requirements	none
Literature	<p><u>Preliminary literature:</u> -</p> <p><u>Accompanying literature:</u></p> <ul style="list-style-type: none"> ○ J. Glenn Brookshear: Computer Science – An Overview; Pearson; 12th edition (April 11, 2014) ○ Paul E. Ceruzzi: A History of Modern Computing (History of Computing); The MIT Press; 2nd edition (April 8, 2003) ○ Matthew MacDonald: Excel 2013 - The Missing Manual; O'Reilly Media; 1st edition (April 2013) ○ Matthew MacDonald: Access 2013 - The Missing Manual; O'Reilly Media; 1st edition (April 2013) ○ Matthew MacDonald: HTML 5 - The Missing Manual; O'Reilly Media; 2nd edition (December 2013) <p><u>In-depth literature:</u> -</p> <p><u>Exercise books:</u> -</p>
Specialities (additional information)	-

Module number	EB-03
Course name	EB1103 Informatics Exercises
Module component	Informatics for Engineering
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
Module coordinator	Prof. Dr.-Ing. Stefan Götze
Lecturers	Prof. Dr.-Ing. Stefan Götze
Area of specialisation	General
Semester	1
Duration of module	1 Semester
Frequency of module	Annual
Type of module	Compulsory
Niveau	Bachelor
Semester periods per week (SWS)	Lecture: - Tutorials: 2
Creditpoints (ECTS)	2
Work load	<ul style="list-style-type: none"> ○ Time of attendance: 22,5 h ○ Additional workload: 27,5 h ○ Exam preparation: 10 h in total: 60h
Language of instruction	English
<p>Learning outcomes of this module:</p> <p>After completing the module component Informatics Exercises the students achieved the following learning outcomes of this module:</p> <p>Students will become acquainted with spreadsheet and database applications.</p> <p>In the module component Informatics Exercises the following competences should be achieved:</p> <p>Expertise: Students will become acquainted with computers and different applications that are common in industrial engineering. Thus they will be able to assess the capacity and the limitations of computers and related applications.</p> <p>Method competences: Students will learn how to work systematically and in a way engineers would do to solve problems. They will also learn how to break a problem into parts that can be handled and solved more easily.</p> <p>Personal skills: Working at a computer, especially the programming of computers, forces the user to think in a systematical and disciplined way. Students will learn how to deal with their own failing and imperfection.</p> <p>Social skills: Working at a common software development project teamwork skills will be gained or fostered, respectively.</p>	

Educational objectives of this module:	
<ul style="list-style-type: none"> ○ Topics of the lecture such as organization of software development projects or Internet/Web technology provide students for finding their point of view in and to give substantial input to discussions concerning operational information management. ○ Introduction to macro and database programming should lower the threshold using applications available in the office to develop tools that would ease day to day work. 	
Entry requirements and recommended requirements	Basic knowledge of mathematics and science (according to completion High School)
Usability of this module for this program of studies	This module enables the students to follow lectures on computer related topics such as "Production System Engineering", "Data Communication and Processing / Industry 4.0" or "Data and Signal Acquisition and Processing".
Usability of this module for other programs of studies	Informatics and information technologies are relevant in all fields of engineering science.
Teaching form	Course teaching / exercises /tutorials / home work
Use of media	White board / visualizer / projector / interactive EXCEL sheets / videos
Duration of examination	90 minutes
Type of examination	Written module exam (GMPschr. 90min.)
Entrance requirements	-
Specialities (additional information)	-
Literature	<p>Preliminary literature: -</p> <p>Accompanying literature:</p> <ul style="list-style-type: none"> ○ Matthew MacDonald: Excel 2013 – The Missing Manual; O’Reilly Media; 1st edition (April 2013) ○ Matthey MacDonald: HTML 5 – The Missing Manual; O’Reilly Media; 2nd edition (December 2013) <p>In-depth literature: -</p> <p>Exercise books: -</p> <p>Formulary: -</p>

Module number	EB-03
Course name	EB2102 Informatics 2
Module component	Informatics for Engineering
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
Module coordinator	Prof. Dr.-Ing. Stefan Götze
Lecturers	Prof. Dr.-Ing. Stefan Götze
Area of specialisation	General
Semester	2
Duration of module	1 Semester
Frequency of module	Annual
Type of module	Compulsory
Niveau	Bachelor
Semester periods per week (SWS)	Lecture: 2 Tutorials: 2
Creditpoints (ECTS)	4
Work load	<ul style="list-style-type: none"> ○ Time of attendance: 45 h ○ Additional workload: 55 h ○ Exam preparation: 20 h In total: 120 h
Language of instruction:	English
<p>Learning outcomes of this module: After completing the module component Informatic 2 the students achieved the following learning outcomes of this module:</p> <p>In this module component the students will become acquainted with software engineering and programming using a common programming language.</p> <p>In the module component Informatics 2 the following competences should be achieved:</p> <p>Expertise: Student will learn how to program a computer using a standard, partially objectoriented programming language.</p> <p>Method competences: Students will learn how to work systematically and in a way engineers would do to solve problems. They will also learn how to break a problem into parts that can be handled and solved more easily.</p> <p>Personal skills: Working at a computer, especially the programming of computers, forces the user to think in a systematical and disciplined way. Students will learn how to deal with their own failing and imperfection.</p> <p>Social skills: Working at a common software development project teamwork skills will be gained or fostered, respectively.</p> <p>Educational objectives of this module:</p> <ul style="list-style-type: none"> ○ Introduction to Software development using a standard programming language should lower the threshold using applications available in the office to develop tools that would ease day to day work. 	

Entry requirements and recommended requirements	Basic knowledge of mathematics and science (according to completion High School)
Usability of this module for this program of studies	This module enables the students to follow lectures on computer related topics such as "Production System Engineering", "Data Communication and Processing / Industry 4.0" or "Data and Signal Acquisition and Processing".
Usability of this module for other programs of studies	Informatics and information technologies are relevant in all fields of engineering science.
Teaching form:	Course teaching / exercises /tutorials / home work
Use of media	White board/ visualizer / projector
Duration of examination	90 minutes
Type of examination	Written module exam (GMPschr. 90min.)
Entrance requirements	none
Specialities (additional information)	-
Literature	<p>Preliminary literature: -</p> <p>Accompanying literature: Bryan Newsome: Beginning Visual Basic 2015; O'Reilly Media; 1st Edition (November 2015)</p> <p>In-depth literature: -</p> <p>Exercise books: -</p>

EB-04 Technical Mechanics

module name	EB-04 Technical Mechanics
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS18
module history	
Creditpoints (ECTS)	5
Module number	EB-04
Module components (courses)	EB1104 Technical Mechanics (statics, material strength)
Responsible for module	Prof. Dr. Stefan Mátéfi-Tempfli
major field of study	Management and Engineering
Duration of examination	90 min
Type of examination	GMPSchr 90 min.
Module description	After completing the module Technical Mechanics the students understand engineering mechanics, statics of structures and beams, understand mechanical properties of materials, their strengths and elastic deformations. The module develops competences and skills in analysing the statics of engineering
Module level	Bachelor
Grade weighting	5/210
Learning outcomes of this module:	
<p>Expertise:</p> <ul style="list-style-type: none"> • In engineering mechanics, applying principles, techniques and calculus. • Understanding engineering mechanics, statics of structures and beams. • Understanding mechanical properties of materials, their strengths and elastic • In analysis of mechanical systems and complex problem solving. • <p>Personal and Social skills:</p> <ul style="list-style-type: none"> • Calculating systems of concentrated and distributed forces, moments and couples for mechanical structures. • Calculating mechanical systems in static equilibrium and limits of equilibrium conditions. • Calculating external and internal effects on loaded beams. • Calculating deformations (1D) based on simple stresses and material data. • Develop analytical thinking, attention to details and ability to consider different strategies to solve problems. <p>Kompetenzen / Method competences:</p> <ul style="list-style-type: none"> • Ability to analyze the statics of engineering products <p>Ability to consider different strategies to solve problems</p>	
Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	-
Literature	-
Teaching and learning methods	seminaristic teaching / exercises / home work
Specialities (Additional information)	-

course name	EB1104 Technical Mechanics (statics, material strength)	
Module	EB-04 Technical Mechanics	
examination regulations	NuW-IE-B-WS18	
Course history		
major field of study	Management and Engineering	
Semester	2	
Weekly semester hours	4	
Credit Points	5	
Winter- / summersemester	Winter Semester	
Work load in hours	Attendance time: 60 h, Homework and other workload 65 h, exam preparation 25 h In total: 150 h	
Course Code	EB1104	
Teaching Language	English	
Type of course	<input type="checkbox"/>	FWP - voluntary elective subject
	<input type="checkbox"/>	Core / optional compulsory subject
	<input checked="" type="checkbox"/>	Compulsory subject
	<input type="checkbox"/>	PLV – accompanying course for internship
	<input type="checkbox"/>	SWP - compulsory elective subject
	<input type="checkbox"/>	Elective subject
Course lecturer	Prof. Dr. Stefan Mátéfi-Tempfli	
Type of examination	GMPschr 90 min.	
Responsible for module	Prof. Dr. Stefan Mátéfi-Tempfli	
Learning content of this course:	<ul style="list-style-type: none"> • Definitions, Newton's laws, fundamental terms and units, scalars and vectors, force, moment of a force • Vectors, properties, trigonometric functions, unit vectors, addition, subtraction, dot and cross products. • System of forces, principle of transmissibility, rectangular components, moment of a force, Varignon's theorem, couples, resultant of system of forces. • Equilibrium conditions, free body diagrams, support reactions. • Distributed forces, center of gravity, center of mass, centroids, composite techniques, beams subjected to distributed forces. • Internal effects, sign conventions, normal, shear and bending moment, internal effect diagrams. • Stress calculations, material strength, yield and admissible stress, normal and shear stress, bending stress, area moment of inertia, elastic section modulus. • Deformation, Hookes law, deflection of beams, curvature, slope and elastic curve equations. • Friction, static friction, impending motion and kinetic friction, belt friction. 	

<p>Literature</p>	<ul style="list-style-type: none"> • Engineering Mechanics - Vol. 1: Statics, 2nd ed. by D. Gross, W. Hauger, J. Schröder, W. A. Wall, N. Rajapakse, Springer 2013, ISBN 978-3-642-30318-0 • Engineering Mechanics - Vol. 2: Mechanics of Materials, 1st ed., D. Gross, W. Hauger, J. Schröder, W. A. Wall, J. Bonet, 2011, ISBN 978-3-642-12885-1 • Mechanics of Materials, 8th ed. by Russell C. Hibbeler, 2011, 978-0-13-602230-5 • Engineering Mechanics: Statics 7th ed. by James L. Meriam, L. G. Kraige, ISBN 978-0-470-61473-0 • Aufgabe zu Technische Mechanik 1-3: Statik, Elastostatik, Kine- tik 8th ed. by W. Hauger, V. Mannl, W. A. Wall, E. Werner, 2014, ISBN 978-3-642-41353-7
<p>Teaching and learning methods</p>	<p>Seminaristic teaching / exercises / home work</p>
<p>Specialities (additional information)</p>	<p>-</p>

EB-05 Principles in Business

module name	EB-05 Principles in Business
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS18
modul history	
Creditpoints (ECTS)	10
Module number	EB-05
Module components (courses)	EB1105 Fundamentals in Business Administration and Economics EB1106 Accounting
Responsible for module	Prof. Dr. R. Brotsack
major field of study	General
Duration of examination	120 min.
Type of examination	GMPschr.
Module description	
Modul level	Bachelor
Grade weighting	10/210
Learning outcomes of this module:	
<p>Expertise: Basic knowledge about consolidated financial statement and financial accounting in Germany. In financial accounting, the regulations of the commercial code with regarding to balancing and operating statement in conjunction with tax accounting law will teaches amongst others. Beside the specific legal forms, also the topics public disclosure and fundamentals of the financial statement analysis will mediated.</p>	
<p>Skills: After completing the student will be able to explain and apply basic economic terminology, formulate and address economic and public policy issues using the language and approach of economics, set up and solve simple economic problems related to the technical topics in this module and articulate economic reasoning and results to others. The stu as of companies and business, the respective functions of those.</p>	
<p>Method competences: Students should be able to analyse and understand the economic situation of the company presented in the balance sheets. Applicationoriented knowledge in external accounting and knowledge of the legal foundations in commercial and tax law are the basis for lawful behavior. Students acquire the necessary basic knowledge for the performance of management tasks in order to be able to make and implement entrepreneurial decisions in the knowledge of business and economic contexts. Students are able to understand the meaning and importance of economic action from colleagues in a company and are able to analyse and evaluate economic issues. Understanding and applying basic economic principles and having a basic knowledge of business administrative tools and functions.</p>	

Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	-
Literature	Check course description
Teaching and learning methods:	Lecture / exercises
Specialities (additional information)	-

course name	EB1105 Fundamentals of Business Administration
Module	EB-05: Principles in Business
examination regulations	NuW-IE-B-WS18
Course history	
major field of study	General
Semester	1
Weekly semester hours	4
Credit Points	5
Winter- / summer semester	WS
Work load in hours	Attendance time: 45 h, Additional workload: 55 h exam preparation: 20 h In Total: 120 h
Course Code	EB1105 Fundamentals of Business Administration
Teaching Language	German / English
Responsible for module	Prof. Dr. R. Brotsack
Type of course	FWP - voluntary elective subject
	Core / optional compulsory subject
	X compulsory subject
	PLV – accompanying course for internship
	SWP - compulsory elective subject
	Elective subject
Course lecturer	Prof. Dr. Feicht
Type of exam	Written exam 60 min
Learning content of this course	<p>Business Administration</p> <ul style="list-style-type: none"> •Basics •Material Management •Production •Financing •Investment •Human Resource •Organization •Management <p>Macroeconomics & Microeconomics</p> <ul style="list-style-type: none"> •Ten Principles of Economics •Market forces of supply and demand •Elasticity •Efficiency of markets •Taxation and government influence •International trade •Externalities •Public goods and common resources •Costs of production •Competitive markets •Monopoly and Oligopoly •Gross Domestic Product •Consumer price index •Inflation •Unemployment

<p>Literature</p>	<p>Preliminary literature: (of a series of many advanced courses)</p> <ul style="list-style-type: none"> • Thommen, J., Achleitner, A.-K.: Allgemeine Betriebswirtschaftslehre, Gabler, 7., vollst. überarb. Auflage, Wiesbaden 2012 • Pride, Huges, Kapoor: Business, 12th Edition, International Edition, South Western, 2014 • Mankiw: Essentials of Economics, Fifth, Edition International student edition, South Western, 2009 <p>Accompanying literature:</p> <ul style="list-style-type: none"> • Robert S. Pindyck and Daniel L. Rubinfeld, Microeconomics (8th edition 2012) • Paul Krugman und Robin Wells, Microeconomics (3rd edition 2012) • Nicholas Gr. Mankiw and Mark P. Taylor, Economics, 3rd edition 2014 <p>In-depth literature: Exercise books:</p> <ul style="list-style-type: none"> • Thommen, J., Achleitner, A.-K.: Allgemeine Betriebswirtschaftslehre Arbeitsbuch: Repetitionsfragen - Aufgaben - Lösungen; Gabler Verlag; 2013
<p>Teaching and learning methods</p>	<p>Course teaching / exercises /tutorials / home work</p>
<p>Specialities (additional information)</p>	<p>no</p>

course name	EB1106 Accounting	
Module	EB-05: Principles in Business	
examination regulations	NuW-IE-B-WS18	
Course history		
major field of study	General	
Semester	1	
Weekly semester hours	4	
Credit Points	5	
Winter- / Summer Semester	WS	
Work load in hours	Attendance time: 45 h, Home work: 55 h exam preparation 20h In total: 120 h	
Course Code	EB1106 Accounting	
Teaching Language	German / English	
Responsible for module	Prof. Dr. R. Brotsack	
Type of course	<input type="checkbox"/>	FWP - voluntary elective subject
	<input type="checkbox"/>	Core / optional compulsory subject
	<input checked="" type="checkbox"/>	compulsory subject
	<input type="checkbox"/>	PLV – accompanying course for internship
	<input type="checkbox"/>	SWP - compulsory elective subject
	<input type="checkbox"/>	Elective subject
Course lecturer	Prof. Dr. Feicht	
Type of exam	Written exam 60 min	
Responsible for module	Prof. Dr. R. Brotsack	
Learning content of this course		
<ul style="list-style-type: none"> • Tasks and classification of cost accounting • Mandatory accounting by business- and tax law • Fundamentals of adequate and orderly accounting • Accounting entry • Principles of balance sheet • Decisiveness of balance sheet for tax balance sheet • Operating statement • Balance sheet analysis • auditing duty, public disclosure and consolidated financial statement 		
Literature	Law texts: <ul style="list-style-type: none"> • Däumler, K.-D./Grabe J.: Kostenrechnung 1, Grundlagen, 9. Auflage 2003 • Joos-Sachse Th., Controlling, Kostenrechnung und Kostenmanagement, 3. Auflage 2004 • Meyer, Bilanzierung nach Handels- und Steuerrecht, 17. Auflage 2006 • Thiel / Lüdtke-Handjery, Bilanzrecht, 5. Auflage 2005 	
Teaching and learning methods	Course teaching / exercises /tutorials / home work	
Specialities (additional information)	no	

EB-06 Marketing

Module number	EB 06
Module name	Marketing
Course number	EB1107
Course name	Marketing
Module components	
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
Responsible for module	Prof. Dr. rer. Nat. Raimund Brotsack
Lecturer	Stefan Birne
Area of specialisation	General
Semester	1
Duration of module	1 Semester
Frequency of module	annual
Type of module	compulsary
Weekly semester hours	4
Creditpoints (ECTS)	5
Work load	<ul style="list-style-type: none"> ○ Attendance time 45 h ○ Group project 55 h ○ Exam preparation 20 h In total: 120 h
Teaching Language	German/ English
<p>Learning outcomes of this module: After completing the module "Principles of Marketing" the students achieved the following learning outcomes of this module:</p> <p>The basics of marketing segmentation based on the definition of a relevant market.</p> <ul style="list-style-type: none"> • Defining the relevant market based on the identification of product characteristics, generic functionalities and driving economic factors within the industry sectors. • Segmentation variables, definition and application. • Understanding the basics of defining psychographic variables, conducting simple studies and developing simple qualitative interview guidelines. <p>The components and aspects of human information acquisition and processing.</p> <ul style="list-style-type: none"> ○ Top-down and bottom-up information acquisition and processing strategies ○ Semantic networks to The four barriers to successful information transfer in the online age <ul style="list-style-type: none"> • Above the line and below the line communication channels • Advertising styles and their application • Applying the knowledge about human information acquisition and processing to develop customer oriented advertising strategies. <p>Customer's decision-making</p> <ul style="list-style-type: none"> • product lifecycle, business development, and product program management • need recognition, alternative evaluation, and post purchase evaluation • the Kano model; differentiating between different levels of customer satisfaction and excitement • Integrating customers decisions into advertising strategies and product development • Sales management • Sales channels and their characteristics (resellers, retailers, online shops, pop-up stores, etc) 	

- Applying consumer behavior to optimize sales talks and sales strategies Individual consumer and customer differences
- Personality and self image, including the brand management application
- Influencing motivation and attitudes as important aspects of advertising and selling strategies
- Customer knowledge, information processing.
- Understanding the impact of individual differences on customer decisions and information acquisition and processing.

Methods:

The course conveys the principles of marketing through reading assignments, lectures and discussions. Self-organized learning is explicitly integrated through the analysis and presentation of a concrete marketing problem. The goal is to encourage a transfer of knowledge through application of theory to five practical examples.

Teamwork is encouraged through the preparation of a group presentation.

In the module the following competences should be achieved:

Expertise:

Method competences:

Usage of common marketing tools and their application in a company environment. Solving marketing problems by defining a strategy. Target group analysis.

Understand consumer behaviour.

Educational objectives of this module:

Marketing and sales management involve far more than catchy advertising and clever sales pitches. Increasingly, the most important success factor is understanding customer behaviour. The main goal of this course is to equip students with a knowledge of the essentials of consumer behaviour to enable them to better develop customer oriented products and services, convincing advertisements and sales presentations.

Through the use of practical examples, the students also learn to distinguish among marketing and sales strategies and determine which ones are more likely to yield the intended results.

Students also acquire an understanding of the mechanisms and the major methodologies of the marketing mix: product, promotion, placement and price.

Entry requirements and recommended requirements	none
Use of media	Presentation
Type of exam	Written exam 120 Min.
Literature	<ul style="list-style-type: none"> ○ Blackwell, R. D./Engel, J. F./ Miniard, P. W.: Consumer Behaviour, Fort Worth, 2005, 10. Auflage, bzw. neuere Auflagen. ○ Blythe, J.: Principles and Practice of Marketing, Fort Worth, 2009, 2. Auflage, bzw. neuere Auflagen.
Speciality (additional information)	

EB-07 Business Law

module name	EB-07 Business Law
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS18
modul history	
Creditpoints (ECTS)	6
Module number	EB-07
Module components (courses)	EB2103 - Private law EB2104 - Taxes
Responsible for module	Dr. Appel, Herr Bican
major field of study	General
Type and Duration of exam	Written exam 120min
Module description	
Modul level	Bachelor
Grade weighting	8/210
Learning outcomes of this module	
<p>Expertise To enable the students to know typical juristic risks in a company and find concrete solution, this module mediate fundamental skills in risk- and compliancemanagement. It also sensitise at the same time for specifications, regulations and standardisations, which employees as well as companies have to know, consider and document their obedience. The students learn the possible impact of mistakes in this field to the company, are able to organise arrangements to go against these failures, and are able to act prophylactic. Additional the part tax law teaches the funda- mental specifications of company taxation as well as tax law of selected forms of organisations. The lecture is completed by the basics of income taxes, sales taxes and the difference between business partnership and stock cooperation.</p>	
<p>Skills The students won´t be taught as a lawyer, primer they should understand the basics of the topics. Furthermore, the students should be able to recognise if problems can be solved internal or if they have to consider a jurist in their future professional life. Die Studierenden werden dabei nicht zu Juris- ten mit</p>	
<p>Method competences Understanding and applying basic principles and having a basic knowledge of business law and taxes.</p>	
Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	no
Literature	See course description
Teaching and learning methods	Course teaching / exercises /tutorials / home work
Specialities (additional information)	no

course name	EB2103 Private law
Module	EB-07: Business Law
examination regulations	NuW-IE-B-WS18
Course history	
major field of study	General
Lehrplansemester / Semester	1
Weekly semester hours	4
Credit Points	4
Winter- / Summer semester	SS
Work load in hours	Attendance time: 45 h, additional workload: 55 h exam preparation: 20 h In Total: 120 h
Course Code	EB2103 Private law
Teaching Language	German / English
Type of course	<input type="checkbox"/> FWP - voluntary elective subject
	<input type="checkbox"/> Core / optional compulsory subject
	<input checked="" type="checkbox"/> compulsory subject
	<input type="checkbox"/> PLV -accompanying course for internship
	<input type="checkbox"/> SWP - compulsory elective subject
<input type="checkbox"/> Elective subject	
Course lecturer	Dr. Appel
Type of exam	Written exam (60 min)
Responsible for module	Dr. Appel
Learning content of this course:	
<ul style="list-style-type: none"> • Individual fields of risk in a company • Types of contract: agreement for sale, contract for work and labour, contract for work and materials, contract of employment • Potential aftermath of defects in the product • Scheme about the legal relationships and important rights to the supply chain • The new legal situation to the liability to defects • Quality supply agreement • Product liability by the product liability act • Responsibility under criminal and civil law of manager, supervisor and employees by product liability • Product liability insurance • Product liability (USA, inside/outside the EU) • Basics on the reform of the law of obligations • Limitation to the freedom of contract • General terms and conditions under new law • Overview of the general economic law (commercial law and company law) • Main features about the economic law • Insolvency 	
Literature	Scherer/Mühlbauer/Unterwiener u. a. Den Rücken frei: No risk, much fun!: Praxiswissen Risikomanagement und Compliancemanagement, ISBN-Nr. 3-937520-00
Teaching and learning methods	Course teaching / exercises /tutorials / home work
Specialities (additional information)	no

course name	EB2104 Taxes law
Module	EB-07: Business Law
examination regulations	NuW-IE-B-WS18
Course history	
major field of study	General
Semester	1
Weekly semester hours	4
Credit Points	4
Winter- / Summer Semester	SS
Work load in hours	Attendance time: 45 h, additional workload 55 h exam preparation 20 h In Total: 120 h
Course Code	EB2104 Taxes
Teaching Language	German / English
Type of course	<input type="checkbox"/> FWP - voluntary elective subject
	<input type="checkbox"/> Core / optional compulsory subject
	<input checked="" type="checkbox"/> compulsory subject
	<input type="checkbox"/> PLV -accompanying course for internship
	<input type="checkbox"/> SWP - compulsory elective subject
	<input type="checkbox"/> Elective subject
Course lecturer	Dr. Appel
Type of exam	Written exam 60 min
Responsible for module	Dr. Appel
Learning content of this course:	<ul style="list-style-type: none"> • Increments of the income tax • Basic terms and definitions of the income tax • Methods to the ascertainment of profits • Consideration of loss by the income tax • Increments of the corporation tax • Determination of the taxable income • allowable and not allowable expense • hidden profit distribution and depositions • increments of the profit tax liability • taxation-related circumstances of the value added tax act
Literature	<ul style="list-style-type: none"> • Herrler, Hans u.a., Betriebliche Steuern, Band 2, Ertragsteuern; 2. Auflage, Schäffer-Poeschel Verlag, Stuttgart, 2006 • Zenthöfer, Wolfgang, Leben, Gerd, Körperschaftsteuer, Gewerbesteuer, Band 11, Schäffer-Poeschel Verlag, Stuttgart, 2001
Teaching and learning methods	Course teaching / exercises /tutorials / home work
Specialities (additional information)	no

EB-08 Principles in Natural Sciences including lab work

Module name	EB-08 Principles in Natural Sciences including lab work
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS18
modul history	
Creditpoints (ECTS)	10
module number	EB-08
Module components (courses)	EB2105 Physics EB2106 Chemistry EB2107 Biology
Responsible for module	Prof. Dr. rer. nat. Stefan Kreiskott
major field of study	General
Duration of module exam in min.	120 min.
Type of exam	GMPschr.
Module description	
Modul level	Bachelor
Grade weighting	10/210
Learning outcomes of this module:	<p>Expertise: Procurement of fundamental knowledge about basics in science. The modul is divided in three courses: Physics – Chemistry - Biology</p> <p>Skills After completing the student will be able to understand and explain the fundamentals of physics, chemistry and biology.</p> <p>Method competences: The students present the results of their studies clearly and effectively verbally and in written form. The students are able to execute basic experiments with the aid of scientific devices. They learn how to solve scientific problems with the aid of formularies and calculators.</p>
Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	no
Literature	See course description
Teaching and learning methods	Lecture with exercises
Specialities (additional information)	no

course name	EB2105 Physics
Module	EB-08 Principles in Natural Sciences including lab work
examination regulations	NuW-IE-B-WS16
Course history	
major field of study	Allgemein / mandatory
Semester	1
Weekly semester hours	4
Credit Points	4
Winter- / Summer semester	WS
Work load in hours	Attendance time: 22,5 h, Additional workload: 52,5 h exam preparation: 15 h in total: 90 h
Course Code	EB2105 Physics
Teaching Language	German / English
Responsible for module	Prof. Dr. rer. nat. Stefan Kreiskott
Type of course	<input type="checkbox"/> FWP - voluntary elective subject
	<input type="checkbox"/> Core / optional compulsory subject
	<input checked="" type="checkbox"/> compulsory subject
	<input type="checkbox"/> PLV – accompanying course for internship
	<input type="checkbox"/> SWP - compulsory elective subject
	<input type="checkbox"/> Elective subject
Course lecturer	Prof. Dr. rer. nat. Sascha Kreiskott
Type of exam	GMPSchr. 120 min
Learning content of this course:	<ul style="list-style-type: none"> • Introduction to physics • Units and Measurement • Length, time and mass • Motion along a straight line • Motion in several dimensions • Force and motion • Kinetic energy and work • Potential energy and energy conservation • Center of mass and linear momentum • Rotation • Rolling, torque and angular momentum • Fluids • Oscillations • Waves • Temperature, heat and the first law of thermodynamics • Kinetic theory of gases • Entropy and the second law of thermodynamics
Literature	J. Walker, D. Halliday, R. Resnick, Principles of Physics 10 th edition, Wiley E. Mazur, Principles & practice of physics, Pearson Education 2015
Teaching and learning methods	Course teaching / exercises /tutorials / home work
Specialities (additional information)	no

course name	EB2106 Chemistry	
Module	EB-08 Principles in Natural Sciences including lab work	
examination regulations	NuW-IE-B-WS18	
Course history		
major field of study	General	
Semester	1	
Weekly semester hours	4	
Credit Points	4	
Winter- / Summer Semester	WS	
Work load in hours	Attendance time: 22,5 h, Additional workload 52,5 h exam preparation 15 h In total: 90 h	
Course Code	EB2106 Chemistry	
Teaching Language	German / English	
Type of course	<input type="checkbox"/>	FWP - voluntary elective subject
	<input type="checkbox"/>	Core / optional compulsory subject
	<input checked="" type="checkbox"/>	compulsory subject
	<input type="checkbox"/>	PLV -accompanying course for internship
	<input type="checkbox"/>	SWP - compulsory elective subject
	<input type="checkbox"/>	Elective subject
Course lecturer	Prof. Dr. R. Brotsack	
Type of exam	GMP Schr. 120 min	
Responsible for module	Prof. Dr. rer. nat. Stefan Kreiskott	
Learning content of this course:	<ul style="list-style-type: none"> • Introduction to chemistry • Atomic Structure • The periodic table of elements • condition of substances, aggregate states, phase transformations, modification • Chemical bonding • Chemical reactions • Principles of organic chemistry • Oil and coal • Solvents • Polymers • Corrosion and corrosion protection 	
Literature		
<ul style="list-style-type: none"> • S.S. Zumdahl, S.A. Zumdahl, D. J. DeCoste; "Chemistry"; 10th edition; Cengage Learning; Boston; 2016 • J.T. Moore, "Chemistry for dummies"; 2nd edition, Wiley; Hoboken; 2011 • J.T. Moore, "Chemistry Essentials for dummies"; 2nd edition, Wiley; Hoboken; 2010 • E.R. Riedl, H.-H. Meyer; "Allgemeine und anorganische Chemie"; De Gruyter, Berlin / Boston; 11. Auflage, 2013 		
Teaching and learning methods	Course teaching / exercises /tutorials / experimental demonstrations in the lecture room / home work	
Specialities (additional information)	none	

course name	EB2107 Biology
Module	EB-08 Principles in Natural Sciences including lab work
examination regulations	NuW-IE-B-WS18
Course history	
major field of study	General
Semester	2
Weekly semester hours	2
Credit Points	2
Winter- / Summer Semester	WS
Work load in hours	Attendance time: 22,5 h, Additional workload 27,5 h exam preparation 10 h In total: 60 h
Course Code	EB2107 Biology
Teaching Language	German / English
Type of course	<input type="checkbox"/> FWP - voluntary elective subject
	<input type="checkbox"/> Core / optional compulsory subject
	<input checked="" type="checkbox"/> compulsory subject
	<input type="checkbox"/> PLV - accompanying course for internship
	<input type="checkbox"/> SWP - compulsory elective subject
	<input type="checkbox"/> Elective subject
Course lecturer	Philipp Erhardt
Type of exam	GMPSchr. 120 min
Responsible for module	Prof. Dr. rer. nat. Stefan Kreiskott
<p>Learning content of this course</p> <ul style="list-style-type: none"> • The Cell: The prokaryotic and eukaryotic cell as the building blocks of life: Structure and function of the cellular organelles • Metabolism: Catabolic and anabolic reactions as life-sustaining chemical transformations within cells: E.g. photosynthesis, aerobic respiration, ethanol fermentation, lactic acid fermentation • Microbiology: Microscopic organisms and their use in biotechnology: E.g. Escherichia coli, Saccharomyces cerevisiae <p><u>Learning outcomes of this module:</u> After completing the module Principles of Biology the students achieved the following learning outcomes of this module: The students demonstrate a general understanding of the central features of cellular biology, systematics of microorganisms and the metabolism of the cell. In the module Principles of Biology the following competences should be achieved: <u>Expertise:</u> The students demonstrate a general understanding of the basic principles of the relevant biological subdisciplines and are able to discuss these principles in terms of modern industrial operations.</p>	
Literature	Accompanying literature: <ul style="list-style-type: none"> • Reece, Jane B. et al. (2016). Campbell Biology 10th ed. Pearson, London (ISBN 0134093410)
Teaching and learning methods	Course teaching / exercises /tutorials / experimental demonstrations in the lecture room / home work
Specialities (additional information)	no

EB-09 English

module name	EB-09 English
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS18
modul history	
Creditpoints (ECTS)	4
Module number	EB-09
Module components (courses)	EB2108 Technical English 1 EB3102 Technical English 2
Responsible for module	Tanja Mertadana
major field of study	General
Duration of module exam in min.	
Type of exam	See courses
Module description	
Modul level	Bachelor
Grade weighting	4/210
Learning outcomes of this module	
<p>Expertise: The four core language skills (listening, reading, speaking, and writing) will be trained through work on a wide spectrum of customized units. Special focus will be placed on students' interactive participation in and relationship to subjects embedded in a business context.</p> <p>Skills After completing, the students are able to discuss technical and business affairs in english.</p> <p>Method competences: After completing the module EB-09, students will have achieved the following learning targets:</p> <ul style="list-style-type: none"> • applying the language of their everyday lives to the business and technical world • gaining a deeper insight into today's business and technical environment • acquiring a wide range vocabulary and contextual grammar • becoming adept at using business resources that focus on processes and outcomes. 	
Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	no
Literature	See courses
Teaching and learning methods	Lecture with exercises
Specialities (additional information)	no

Course number	EB-2108
Course name	Technical English I (B2)
Module number	EB-09
Module name	English
Module components	
Part of curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
Responsible for module	Tanja Mertadana
Course lecturer	Lecturers for the Language and Electives Centre
Area of specialisation	Technical English
Semester	2
Duration of course	1 semester
Frequency of course	annually
Type of course	Language training course
Weekly semester hours	2
Credit points (ECTS)	2
Workload	60 hours
Teaching language	English
<p>Learning outcomes of the course:</p> <p>After completing the module EB-2108, students should be able to apply their newly acquired language competency to real-life, hands-on tasks like explaining processes, differentiating materials, and identifying and applying the different technological fields covered throughout the semester.</p> <p>Through a wide range of topical communication activities, students become more aware, motivated and confident vis-à-vis their language production in a variety of technical contexts.</p> <p>In addition, students should be able to use their communication skills and specialist knowledge more effectively and thus should be more self-confident in using the English language in engineering settings.</p> <p>Concentration is placed on improving students' technical grammar structures, technical vocabulary, and pronunciation.</p> <p>Contents of the module:</p> <p>During the first semester, the four core language skills (listening, reading, speaking, and writing) will be trained through work on a wide spectrum of customized units. Special focus will be placed on students' interactive participation in and relationship to subjects embedded in a technical/engineering context.</p> <p><i>Automobile technology</i></p> <ul style="list-style-type: none"> 1.1 Interfaces 1.2 Interior/exterior 1.3 The engine 1.4 Relative clauses <p><i>Tools</i></p> <ul style="list-style-type: none"> 2.1 Different types of tools 2.2 Tool applications 	

Technology in use

- 3.1 Describing technical functions and applications (e.g., GPS applications)
- 3.2 Explaining how technology works
- 3.3 Descriptive verbs and adjectives

Specifications

- 4.1 Size and distance
- 4.2 Question forms
- 4.3 Measurements and conversions

Tracking devices

- 5.1 Countable vs. uncountable nouns
- 5.2 Quantifiers
- 5.3 The environment: making comparisons
- 5.4 First conditional
- 5.5 Intensifiers

Materials in technology

- 6.1 Describing specific materials
- 6.2 Specifying and describing properties
- 6.3 Discussing quality

Alternative technology

- 7.1 Decentralized energy
- 7.2 Wave energy innovator
- 7.3 Wind power (making inferences)
- 7.4 Past continuous vs. past simple

Educational objectives of this course:

Entry requirements and recommended requirements	B1+/B2; intermediate plus to upper-intermediate level
Usability of this course for this programme of studies	Technical English for engineers
Teaching form	Projects, research work; in-class presentations; individual, pair and group work; problem-solving tasks; quizzes
Use of media	Videos
Type of exam	Written exam (60 min.)
Specialities (additional information)	Automobile plant; tour of BMW's main production site in Dingolfing, Bavaria

Literature:

- Bonamy, David. *English For Technical Students*. Harlow: Pearson Longman, 2007.
- Brieger, Nick/ Pohl, Alison. *Technical English Vocabulary and Grammar*. Summertown: Summertown Publ., 2007.
- Dunn, Marian, et al. *English for Mechanical Engineering in Higher Education Studies*. Reading: Garnet, 2015.
- Glendinning, Eric H. *Technology For Engineering & Applied Sciences*. Oxford: Oxford Univ. Press, 2013.
- Hollett, Vicki/ Sydes, John. *Tech Talk. Intermediate Students Book*. Oxford: Oxford Univ. Press, 2011.
- Ibbotson, Mark/ Day, Jeremy. *Cambridge English For Engineering*. Cambridge: Cambridge Univ. Press, 2013.
- Kavanagh, Marie. *English for the Automobile Industry*. Berlin: Cornelsen, 2012.
- Lambert, Valerie/ Murray, Elaine. *Everyday Technical English*. Harlow: Pearson Education, 2008.
- Morgan, David/ Regan, Nicholas. *Take-Off. Technical English for Engineering*. Reading: Garnet Publ., 2013.
- Phillips, Anna/ Phillips Terry. *Moving into Mechanical Engineering. Intermediate*. Reading: Garnet Education, 2016.
- Strovs-Gagic, Milena. *English For Mechanical Engineering*. Ljubljana: Print, 2009.
- Wagner, George/ Lloyd Zörner, Maureen. *Technical Grammar and Vocabulary. A practice book for foreign students*. Berlin: Cornelsen & Oxford, 2000.

Course number	EB-3102
Course name	Technical English II (B2/C1)
Module number	EB-09
Module name	English
Module components	
Part of curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
Responsible for module	Tanja Mertadana
Course lecturer	Lecturers for the Language and Electives Centre
Area of specialisation	Technical English
Semester	3
Duration of course	1 semester
Frequency of course	Annualy
Type of course	Language training course
Weekly semester hours	2
Credit points (ECTS)	2
Workload	60 hours
Teaching language	English
Learning outcomes of the course:	
<p>After completing the module EB-3102, students should be able to apply their newly acquired language competency to real-life, hands-on tasks like explaining processes, differentiating materials, and identifying and applying the different technological fields covered throughout the semester.</p> <p>Through a wide range of topical communication activities, students become more aware, motivated and confident vis-à-vis their language production in a variety of technical contexts.</p> <p>In addition, students should be able to use their communication skills and specialist knowledge more effectively and thus should be more self-confident in using the English language in engineering settings.</p> <p>Concentration is placed on improving students' technical grammar structures, technical vocabulary, and pronunciation.</p>	
Contents of the module:	
<p>The main purpose for science and engineering students in their second semester is to equip themselves with the language and life skill sets they need to realize their career goals. To this end, this course provides ample opportunities for students to build awareness of and practice in language in real-life scenarios.</p> <p>In addition, the integrated skills approach of the course develops students' self-confidence to survive and succeed in professional and social encounters within an English-speaking community.</p> <p><i>Design and testing</i></p> <ol style="list-style-type: none"> 1.1 Establishing industrial design as a profession 1.2 Comprises and engineering designs 1.3 Value engineering 1.4 Testing your products <p>Team project: design a new household product</p>	

Manufacturing and industry

- 2.1 Expert knowledge in a variety of fields
- 2.2 Working for an electric utility company
- 2.3 Coordinating a computer system
- 2.4 Describing chemical engineering tasks
- 2.5 Combining semiconductors with phosphors
- 2.6 Mechanical engineers also design tools
- 2.7 Team project: plan a new manufacturing facility

Safety, maintenance, and quality control

- 3.1 Case study: What caused the explosion?
- 3.2 Prevention of accidents
- 3.3 Wearing special clothes
- 3.4 The amplitude of motion
- 3.5 Quality and a finished item
- 3.6 Team project: devise a quality control programme

Careers and employment

- 4.1 Computerization and its role
- 4.2 Physicists and biotechnology firms
- 4.3 Still a male-dominated profession
- 4.4 Many engineers are licensed PEs
- 4.5 Median earnings
- 4.6 Increase in opportunities
- 4.7 Team Project: organize a careers fair

Educational objectives of this course:

Entry requirements and recommended requirements	B2 - C1 upper-intermediate to advanced level
Usability of this course for this programme of studies	Technical English for engineers
Usability of this course for other programmes of studies	
Teaching form:	Projects; research work; in-class presentations; individual, pair and group work; problem-solving tasks; quizzes
Use of media	Videos
Type of exam	Written exam (60 min.)
Additional information/ special information:	Automobile plant; tour of BMW's main production site in Dingolfing, Bavaria

Literature:

- Bonamy, David. *English For Technical Students*. Harlow: Pearson Longman, 2007.
- Brieger, Nick/ Pohl, Alison. *Technical English Vocabulary and Grammar*. Summertown: Summertown Publ., 2007.
- Dunn, Marian, et al. *English for Mechanical Engineering in Higher Education Studies*. Reading: Garnet, 2015.
- Glendinning, Eric H. *Technology For Engineering & Applied Sciences*. Oxford: Oxford Univ. Press, 2013.
- Hollett, Vicki/ Sydes John. *Tech Talk. Intermediate Students Book*. Oxford: Oxford Univ. Press, 2011.
- Ibbotson, Mark/ Day, Jeremy. *Cambridge English For Engineering*. Cambridge: Cambridge Univ. Press, 2013.
- Kavanagh, Marie. *English for the Automobile Industry*. Berlin: Cornelsen, 2012.
- Lambert, Valerie/ Murray, Elaine. *Everyday Technical English*. Harlow: Pearson Education, 2008.
- Morgan, David/ Regan, Nicholas. *Take-Off. Technical English for Engineering*. Reading: Garnet Publ., 2013.
- Phillips, Anna/ Phillips Terry. *Moving into Mechanical Engineering. Intermediate*. Reading: Garnet Education, 2016.
- Strovs-Gagic, Milena. *English For Mechanical Engineering*. Ljubljana: Print, 2009.
- Wagner, George/ Lloyd Zörner, Maureen. *Technical Grammar and Vocabulary. A practice book for foreign students*. Berlin: Cornelsen & Oxford, 2000.

EB-10 Foreign Language I - IV

module name	EB-10 Foreign Language I - IV
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS18
modul history	
Creditpoints (ECTS)	12
Module number	EB-10
Module components (courses)	EB1110 Foreign Language I EB2112 Foreign Language II EB3119 Foreign Language III EB4119 Foreign Language IV
Responsible for module	Tanja Mertadana
major field of study	General
Duration of module exam in min.	
Type of exam	See courses
Module description	
Modul level	Bachelor
Grade weighting	12/210
<p>Learning outcomes of this module:</p> <p>Expertise: The four core language skills (listening, reading, speaking, and writing) will be trained through work on a wide spectrum of customized units. Special focus will be placed on students' interactive participation in and relationship to subjects embedded in a business context.</p> <p>Skills After completing, the students are able to discuss technical and business affairs in a second language.</p> <p>Method competences: After completing the module EB-10, students will have achieved the following learning targets:</p> <ul style="list-style-type: none"> • applying the language of their everyday lives to the business and technical world • acquiring a wide range vocabulary and contextual grammar • becoming adept at using business resources that focus on processes and outcomes. 	
Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	no
Literature	See courses
Teaching and learning methods	Lecture with exercises
Specialities (additional information)	no

Course number	EB-3103
Course name	Language II Level A1 part 1
Module number	EB-10
Module name	Language II
Module components	
Part of curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
Responsible for module	Tanja Mertadana
Course lecturer	Lecturers for the Language and Electives Centre
Area of specialisation	Vote between the following languages (Spanish, Czech, Polish, Hungarian, and French) at the end of the 2nd semester
Semester	3rd semester
Duration of course	One semester
Frequency of course	Yearly
Type of course	Language training course
Weekly semester hours	2 (SWS)
Credit points (ECTS)	3 ECTS
Workload	90 h; Attendance time: 30 h Additional workload 60 h
Teaching language	Respective course language (Spanish, Czech, Polish, Hungarian, or French)



Learning outcomes of the courses:

- Can understand and produce some familiar and daily expressions used in very recurring situations of communication as well as very simple statements aiming at satisfying certain concrete needs of the social life
- Can identify himself and answer questions concerning, for example, his nationality, his age, his place of residence, his school and possibly, to ask himself questions of this type to somebody
- Can participate in an ordinary interaction, at least partially, by means of simple statements (centered on one or two words) also by using his mother tongue or other acquired languages tongues if the interlocutor speaks slowly and clearly and shows himself cooperative and friendly

<http://www.europaeischer-referenzrahmen.de>

Contents of the courses:

- Basic grammar
- Basic vocabulary
- Topics
 - International words
 - Meeting people
 - Dialogue about origin, occupation, age, telephone number, email
 - Family
 - Grocery shopping
 - Numbers up to one million
 - Days of the week, time

Additional issues will be included according to the current development in literature and practice, to the changing industry demands for international project managers, and the need of the students.

Expertise:

Method competences:

Personal skills:

Social skills:

o

Educational objectives of this course:

o

Entry requirements and recommended requirements

Knowledge of basic grammar categories in one's native language (verbs, nouns, adjectives, subjects, direct objects, etc.)

Usability of this course for this programme of studies

This module is a preparatory module for "Language II Level A1 part 2" (EB-4101) as well as for "Language II Level A1 part 3" (EB- 5102).

Usability of this course for other programmes of studies

Teaching form:

Seminar-like class with practical exercises

Use of media

Varies

Type of exam

Written exam (60 min.)

Additional information/ special information:

Literature

Czech:

Maidlová, Jana et al. *Tschechisch kommunikativ: Band 1*. Stuttgart: Schmetterling, 2009.

French:

Guilaine André, Anne et al. *Voyages neu A1. Kurs- und Übungsbuch mit 2 Audio CDs*. Stuttgart: Klett, 2013.

Hungarian:

Literature recommendations can be found in the respective course description on our homepage.

Polish:

Literature recommendations can be found in the respective course description on our homepage.

Spanish:

Lloret Ivorra, Eva M. et al. *Con gusto A1. Lehr- und Arbeitsbuch mit 2 Audio CDs*. Stuttgart: Klett, 2009.

Course number	EB-4101
Course name	Language II Level A1 part 2
Module number	EB-10
Module name	Language II
Module components	
Part of curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
Responsible for module	Tanja Mertadana
Course lecturer	Lecturers for the Language and Electives Centre
Area of specialisation	Based on results of vote on candidate language (Spanish, Czech, Polish, Hungarian, and French)
Semester	4th semester
Duration of course	One semester
Frequency of course	Yearly
Type of course	Language training course
Weekly semester hours	2 (SWS)
Credit points (ECTS)	3 ECTS
Workload	90 h; Attendance time: 30 h Additional workload 60 h
Teaching language	Respective course language (Spanish, Czech, Polish, Hungarian, or French)

Learning outcomes of the courses:

- Can understand and produce some familiar and daily expressions used in very recurring situations of communication as well as very simple statements aiming at satisfying certain concrete needs of the social life
- Can identify himself and answer questions concerning, for example, his nationality, his age, his place of residence, his school and possibly, to ask himself questions of this type to somebody
- Can participate in an ordinary interaction, at least partially, by means of simple statements (centered on one or two words) also by using his mother tongue or other acquired languages tongues if the interlocutor speaks slowly and clearly and shows himself cooperative and friendly

<http://www.europaeischer-referenzrahmen.de/>

Contents of the courses:

- Basic grammar (amongst others present perfect)
- Basic vocabulary
- Topics
 - Daily routine
 - Explaining and asking the way
 - At the restaurant
 - Time of day
 - City, statements of place, means of transport
 - Travelling and vacation

Additional issues will be included according to the current development in literature and practice, to the changing industry demands for international project managers, and the need of the students.

<p>Expertise: Method competences: Personal skills: Social skills:</p> <p>○</p>	
<p>Educational objectives of this course:</p> <p>○</p>	
<p>Entry requirements and recommended requirements</p>	<p>Students must have completed the module EB-3103 in order to attend the module EB-4101.</p>
<p>Usability of this course for this programme of studies</p>	<p>This module is an advanced module of the "Language II Level A1 part 1" (EB-3103) as well as a preparatory module for "Language II Level A1 part 3" (EB-5102).</p>
<p>Usability of this course for other programmes of studies</p>	
<p>Teaching form:</p>	<p>Seminar-like class with practical exercises</p>
<p>Use of media</p>	<p>Varies</p>
<p>Type of exam</p>	<p>Written exam (60 min.)</p>
<p>Additional information/ special information:</p>	
<p>Literature</p>	<p>Czech: Maidlová, Jana et al. <i>Tschechisch kommunikativ: Band 1</i>. Stuttgart: Schmetterling, 2009.</p> <p>French: Guilaine André, Anne et al. <i>Voyages neu A1. Kurs- und Übungsbuch mit 2 Audio CDs</i>. Stuttgart: Klett, 2013.</p> <p>Hungarian: Literature recommendations can be found in the respective course description on our homepage.</p> <p>Polish: Literature recommendations can be found in the respective course description on our homepage.</p> <p>Spanish: Lloret Ivorra, Eva M. et al. <i>Con gusto A1. Lehr- und Arbeitsbuch mit 2 Audio CDs</i>. Stuttgart: Klett, 2009.</p>

Course number	EB-5102
Course name	Language II Level A1 part 3
Module number	EB-10
Module name	Language II
Module components	
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
Responsible for module	Tanja Mertadana
Course lecturer	Lecturers for the Language and Electives Centre
Area of specialisation	Based on results of vote on candidate language (Spanish, Czech, Polish, Hungarian, and French)
Semester	5th semester
Duration of course	One semester
Frequency of course	Yearly
Type of course	Language training course
Weekly semester hours	2 (SWS)
Credit points (ECTS)	3 ECTS
Workload	90 h; Attendance time: 30 h Additional workload 60 h
Teaching Language	Respective course language (Spanish, Czech, Polish, Hungarian, or French)

Learning outcomes of the courses:

- Can understand and produce some familiar and daily expressions used in very recurring situations of communication as well as very simple statements aiming at satisfying certain concrete needs of the social life
- Can identify himself and answer questions concerning, for example, his nationality, his age, his place of residence, his school and possibly, to ask himself questions of this type to somebody
- Can participate in an ordinary interaction, at least partially, by means of simple statements (centered on one or two words) also by using his mother tongue or other acquired languages tongues if the interlocutor speaks slowly and clearly and shows himself cooperative and friendly

<http://www.europaeischer-referenzrahmen.de/>

Contents of the courses:

- Basic grammar (amongst others present perfect)
- Basic vocabulary
- Topics
 - Daily routine
 - Explaining and asking the way
 - At the restaurant
 - Time of day
 - City, statements of place, means of transport
 - Travelling and vacation

Additional issues will be included according to the current development in literature and practice, to the changing industry demands for international project managers, and the need of the students.



Expertise: -
Method competences: -
Personal skills: -
Social skills: -

Educational objectives of this course: -

Entry requirements and recommended requirements	Students must have completed the module EB-3103 and EB-4101 in order to attend the module EB-5102.
Usability of this course for this program of studies	This module is an advanced module of the "Language II Level A1 part 1" (EB-3103) and "Language II Level A1 part 2" (EB-4101).
Usability of this course for other programs of studies	
Teaching form:	Seminar-like class with practical exercises
Use of media	Varies
Type of exam	Written exam (60 min.)
Additional information/ special information:	
Literature	<p>Czech: Maidlová, Jana et al. <i>Tschechisch kommunikativ: Band 1</i>. Stuttgart: Schmetterling, 2009.</p> <p>French: Guilaine André, Anne et al. <i>Voyages neu A1. Kurs- und Übungsbuch mit 2 Audio CDs</i>. Stuttgart: Klett, 2013.</p> <p>Hungarian: Literature recommendations can be found in the respective course description on our homepage.</p> <p>Polish: Literature recommendations can be found in the respective course description on our homepage.</p> <p>Spanish: Lloret Ivorra, Eva M. et al. <i>Con gusto A1. Lehr- und Arbeitsbuch mit 2 Audio CDs</i>. Stuttgart: Klett, 2009.</p>

EB-11 Intercultural Competences

module name	EB-11 Intercultural Competences
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS18
modul history	
Creditpoints (ECTS)	10
Module number	EB-11
Module components (courses)	EB5103 Intercultural Basic Module 1 EB5104 Intercultural Module 2
Responsible for module	Prof. Dr. Johann Nagengast
major field of study	General
Duration of module exam in min.	120 min.
Type of exam	GMPschr.
Module description	
Modul level	Bachelor
Grade weighting	10/210
Learning outcomes of this module:	
<p>Expertise:</p> <ul style="list-style-type: none"> • Cultural differences among international business partners, customers and suppliers often result in tensions and misunderstandings in the whole world, especially in the technical area. Managers and engineers who competently navigate in different cultural environments can contribute substantially to the success of globally active enterprises. • A condition for the acquisition of "intercultural competences" is the recognition that one's own actions are influenced by one's own values and norms. Reflecting on one's own cultural and disciplinary background forms the basis for the understanding of other cultures and functions. <p>Skills</p> <ul style="list-style-type: none"> • Defining Culture • The Characteristics of Culture • The Functions of Culture • Organizational Culture • The Layers and Elements of Culture • Comparing Cultures <p>Method competences:</p> <ul style="list-style-type: none"> • Ability to understand and solve cultural problems • Ability to differentiate between the different types of cultures • Ability to understand the different cultures 	
Usability of this course for other programs of studies	Intercultural problems and challenges can be identified by the students and can be solved by students after the course in a successful manner. All students have a full understanding of intercultural problems and know both theory and practical issue in one selected region by heart.

Entry requirements and recommended requirements	Fluent English Skills and first intercultural experiences
Literature:	
<ul style="list-style-type: none"> • Hall, E. T., Hall, M. R.: Understanding Cultural Differences, reprint, Yarmouth, Intercultural Press (2015) • Hofstede, G.: Cultures and Organizations, 2nd ed., New York et al., Mc Graw-Hill (2015) • Hofstede, G.: Culture's Consequences, 2nd ed., Thousand Oaks, Sage, (2014) • Trompenaars, F., Hampden-Turner, C.: Riding the Waves of Culture, London, Brealey Publishing, (1997) • Trompenaars, F., Hampden-Turner, C.: Managing People across Cultures, Chichester, Capstone Publishing (2004) • Lewis, R. D.: When Cultures Collide, 3rd ed. (or more current), London, Brealey Publishing (2006) 	
Teaching and learning methods:	Seminaristic teaching / exercises / project
Specialities (additional information)	no

course name	EB5103 Intercultural Basic Module
Module	EB-11: Intercultural Competences
examination regulations	NuW-IE-B-WS18
Course history	
major field of study	General
Semester	5
Weekly semester hours	4
Credit Points	5
Winter- / Summer Semester	WS
Work load in hours	Attendance time: 45 h additional workload: 80 h exam preparation: 25h In total: 150 h
Course Code	EB5103
Teaching Language	English
Responsible for module	Prof. Dr. Johann Nagengast
Type of course	<input type="checkbox"/> FWP - voluntary elective subject
	<input type="checkbox"/> Core / optional compulsory subject
	<input checked="" type="checkbox"/> compulsory subject
	<input type="checkbox"/> PLV – accompanying course for internship
	<input type="checkbox"/> SWP - compulsory elective subject
	<input type="checkbox"/> Elective subject
Course lecturer	Prof. Dr. Johann Nagengast
Type of exam	Module: Written exam (120 min)
Learning content of this course:	<ul style="list-style-type: none"> • What is normal? • Defining Culture • The Characteristics of Culture • The Functions of Culture • Organizational Culture • The Layers and Elements of Culture • Comparing Cultures • The Impact on the Individual: the "Culture Shock" • Cultural Contexts: Hall • Culture and the Workplace: Hofstede • Practical Aspects of Intercultural Behavior • International Human Resource Development • International Project Management
Literature	See module description
Teaching and learning methods:	Seminaristic teaching / exercises / project
Specialities (additional information)	no

course name	EB5104 Intercultural Module 2
Module	EB-11: Intercultural Competences
examination regulations	NuW-IE-B-WS18
Course history	
major field of study	General
Semester	5
Weekly semester hours	4
Credit Points	5
Winter- / Summer Semester	WS
Work load in hours	Attendance time: 45 h, additional workload: 80 h exam preparation 25h In total: 150 h
Course Code	EB5104
Teaching Language	English
Type of course	<input type="checkbox"/> FWP - voluntary elective subject
	<input type="checkbox"/> Core / optional compulsory subject
	<input checked="" type="checkbox"/> compulsory subject
	<input type="checkbox"/> PLV –accompanying course for internship
	<input type="checkbox"/> SWP - compulsory elective subject
	<input type="checkbox"/> Elective subject
Course lecturer	
Type of exam	Module: Written exam (120 min)
Responsible for module	
Learning content of this course: (sind von Specialisation und nicht Intercultural Module 2!!!)	<ul style="list-style-type: none"> • Special demands of individual regions and cultures • Expatriate Management • Language and Social Reality • Reasons for Cross Cultural Misunderstandings • Improving Cross Cultural Cooperation <p>More topics are to be added based on the actual demand for graduates in this programme, evaluated constantly by qualitative and quantitative research of future employers</p>

Literature	See module description
Teaching and learning methods	Seminaristic teaching / exercises / project
Specialities (additional information)	no

EB-12 Project Work with report

module name	EB-12 Project work with report
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS18
modul history	
Creditpoints (ECTS)	7
Module number	EB-12
Module components (courses)	Course: EB5105 Project work with report
Responsible for module	Prof. Dr. Stefan Mátéfi-Tempfli
major field of study	Both
Duration of module exam in min.	-
Type of exam	Project report
Module description	The module provides practical application of theoretical knowledge gained in different courses. It applies methods and procedures in project management.
Modul level	Bachelor
Grade weighting	6/210
Learning outcomes of this module	
Expertise	
<ul style="list-style-type: none"> • Analyze and structure possible solutions for problems • Distribute and work on tasks, and work packages • Present plausible results and write project report 	
Personal and Social skills	
<ul style="list-style-type: none"> • Work in team and individually • Information exchange between project partners • Communication and dissemination of results 	
Kompetenzen / Method competences	
<ul style="list-style-type: none"> • Methods and procedures in project management • Risk analysis and risk management 	
Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	none
Literature	-
Teaching and learning methods:	project work / seminaristic teaching
Specialities (additional information)	-

course name	EB5105 Project work with report
Module	EB-12 Project work with report
examination regulations	NuW-IE-B-WS18
Course history	
major field of study	Both
Semester	5
Weekly semester hours	6
Credit Points	7
Winter- / Summer Semester	Winter semester
Work load in hours	Attendance time: 67,5 h additional workload 82,5 h preparation of project report 30 h In total: 180 h
Course Code	EB5105
Teaching Language	English
Type of course	<input type="checkbox"/> FWP - voluntary elective subject
	<input type="checkbox"/> Core / optional compulsory subject
	<input checked="" type="checkbox"/> compulsory subject
	<input type="checkbox"/> PLV – accompanying course for internship
	<input type="checkbox"/> SWP - compulsory elective subject
	<input type="checkbox"/> Elective
Course lecturer	
Type of exam	See module
Responsible for module	Prof. Dr. Stefan Mátéfi-Tempfli
Learning content of this course:	<ul style="list-style-type: none"> • Projects and/or subtasks can be theoretical (e.g. literature search, program development, data collection, project management), experimental (e.g. measurements) or building / developing of devices and systems. • Project management methods, managing of resources (e.g. time, material and financial), risk analysis and decision trees. • Documentation of achieved results and reporting
Literature	Project specific
Teaching and learning methods:	project work / seminaristic teaching
Specialities (additional information)	-

EB-13 Bachelor Thesis

module name	EB-13 Bachelor Thesis
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS18
modul history	
Creditpoints (ECTS)	14
Module number	EB-13
components (courses)	EB2109 Methods in scientific work and academic writing EB7101 Bachelor thesis (incl. Final presentation)
Responsible for module	Prof. Dr. Stefan Mátéfi-Tempfli
major field of study	General
Duration of module exam in min.	-
Type of Exam Pschr 90 min. and oral examination (presentation of the Bachelor thesis work and written manuscript) The total grade of the module is computed by the partial grades weighted by the ECTS credits of the module components.	
Module description The module provides an introduction to methods in scientific work and academic writing and the possibility for the students to demonstrate their ability to independently apply the knowledge and skills acquired during the academic studies to complex tasks. Concrete topics and problems will be independently addressed and developed based on scientific methods and documented within a final Bachelor thesis.	
Modul level	Bachelor
Grade weighting	14/210
Moduls Learning outcomes of this module: Expertise: <ul style="list-style-type: none"> • Assessing interdisciplinary topics and applications • Theoretical and/or experimental work for solving practice-oriented problems • Structuring and evaluation of the work in progress • Documenting scientific work and results, presentation and discussion of them, writing the Bachelor thesis Personal and Social skills: <ul style="list-style-type: none"> • Ability to work alone and in a team, communication skills. • Applying of theoretical concepts to practical applications. • Ability to present and defend a scientific work Kompetenzen / Method competences: <ul style="list-style-type: none"> • Problem solving methods, project planning • Employment of software tools for data analysis, processing and scientific graphing and illustrations. 	
Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	Registration for Bachelor thesis is conditioned to have at least 120 ECTS earned.
Literature	-
Teaching and learning methods:	Selfreliant working / seminaristic teaching / team work
Specialities (additional information)	-

course name	EB2109 Methods in scientific work and academic writing	
Module	EB-13 Bachelor thesis	
examination regulations	NuW-IE-B-WS18	
Course history		
major field of study	Beide	
Semester	2	
Weekly semester hours	2	
Credit Points	2	
Winter- / Summer Semester	Summer Semester	
Work load in hours	60 h	
Course Code	EB2109	
Teaching Language	English	
Type of course	<input type="checkbox"/>	FWP - voluntary elective subject
	<input type="checkbox"/>	Core / optional compulsory subject
	<input checked="" type="checkbox"/>	compulsory subject
	<input type="checkbox"/>	PLV – accompanying course for internship
	<input type="checkbox"/>	SWP - compulsory elective subject
	<input type="checkbox"/>	Elective
Course lecturer	Prof. Dr. Stefan Mátéfi-Tempfli	
Type of exam	Pschr 90 min.	
Responsible for module	Prof. Dr. Stefan Mátéfi-Tempfli	
Learning content of this course:		
<ul style="list-style-type: none"> • Introduction to methods in scientific work • Code of ethics of engineers, plagiarism • Working efficiently and time planning • Processing and presenting scientific data and results • Dissemination of results and structure of the most important scientific publications • Review of major scientific writings and of different publication types • How to do literature search • Particular aspects in writing different parts, i.e. abstract, intro- duction, material and methods, results, conclusion, discussion and references • Practice of writing scientific paper and designing posters in team work, presenting the work, getting feedback and give each other feedback 		
Literature		
<ul style="list-style-type: none"> • Eco U., Schick W., Wie man eine wissenschaftliche Abschlussarbeit schreibt, 13. Auflage, UTB 2010 • Ebel Hans Friedrich, Bliefert Claus, Bachelor-, Master- und Doktorarbeit, 4. Auflage, Wiley-VCH Verlag 2009 • Kate L. Turabian, A Manual for Writers of Research Papers, The- ses, and Dissertations, 8th Ed., Chicago Press 2013 		
Teaching and learning methods	seminaristic teaching / team working / assignments	
Specialities (additional information)	-	

course name	EB7101 Bachelor thesis (incl. final presentation)
Module	EB-13 Bachelor thesis
Examination regulations	NuW-IE-B-WS18
Course	
major field of study	Beide
Semester	7
Weekly semester hours	12
Credit Points	12
Winter- / Summer Semester	Wintersemester
Work load in hours	360 h
Course Code	EB7101
Teaching Language	English
Type of course	<input type="checkbox"/> FWP - voluntary elective subject
	<input type="checkbox"/> Core / optional compulsory subject
	<input checked="" type="checkbox"/> compulsory subject
	<input type="checkbox"/> PLV - accompanying course for internship
	<input type="checkbox"/> SWP - compulsory elective subject
	<input type="checkbox"/> Elective
Course lecturer	N.N. supervising Professor
Type of exam	Oral examination (presentation of the Bachelor thesis work and evaluation of the written thesis)
Responsible for module	Prof. Dr. Stefan Mátéfi-Tempfli
Learning content of this course	Theoretical and/or experimental work for solving practiceoriented problems.
Literature	Depending on the selected topic and area of expertise
Teaching and learning methods	Self-reliant working
Specialities (additional information)	-

EB-14 Sustainability

module name	EB-14 Sustainability
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS18
modul history	
Creditpoints (ECTS)	10
Module number	EB-14
Module components (courses)	EB4102 Environment and Climate EB4103 Certification Systems (LCA) EB4104 Energy and Resource Efficiency
Responsible for module	Prof. Dr. Raimund Brotsack
major field of study	General
Duration of module exam in min.	120 min.
Type of exam	GMPSchr
Module description	
Modul level	Bachelor
Grade weighting	10/210
<p>Learning outcomes of this module:</p> <p>Expertise: Students acquire in-depth knowledge of the material cycles in nature with the aim of deriving strategies for sustainable development. In addition, the effects of the climate-damaging gas-emitting industrial company on climate-related changes in nature and society will be intensified. Based on this, methods are taught how products, production processes and energy generation technologies can be certified with regard to their sustainability. In this module, students gain knowledge about current technical possibilities to increase energy and resource efficiency. The objective of the module is to master basic methods and procedures for evaluating the energy and resource efficiency of buildings and facilities with regard to energy consumption and consumption as well as the use of materials.</p> <p>Skills : The acquired knowledge forms the basis for an understanding of the challenges associated with the transformation towards a sustainable industrial society. Practical examples enhance the knowledge.</p> <p>Method competences: The students should acquire basic knowledge in the field of sustainable development of products, technologies and processes and gain this knowledge on the basis of real practical examples. The students should be enabled to apply the acquired knowledge and to critically evaluate and interpret subjectspecific information on the basis of scientific and technical basics. Students acquire the skills to contribute to the sustainable transformation of the industrial society in the awareness of their actions. Skills are acquired for the systematic technical and economic analysis, the development and evaluation of energy and resource efficiency as well as energy management as a holistic concept.</p>	
Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	Recommended prerequisite: EB-25 Renewable Energies
Literature	See course description
Teaching and learning methods	seminaristic teaching / exercises / tutorials / home work / excursions
Specialities (additional information)	Excursion

course name	EB4102 Environment and Climate	
Module	EB-14: Sustainability	
examination regulations	NuW-IE-B-WS18	
Course history		
major field of study	General	
Semester	4	
Weekly semester hours	2	
Credit Points	3	
Winter- / Summer Semester	SS	
Work load in hours	90 h; Attendance time: 22,5 h incl. multi-day excursion Additional workload 52,5 h exam preparation 15 h	
Course Code	EB4102 Environment and Climate	
Teaching Language	German / English	
Type of course	X	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject – both majors
		PLV –accompanying course for internship
		SWP - compulsory elective subject
		Elective subject
Course lecturer	Prof. Dr. Raimund Brotsack / Prof. Dr. Roland Zink	
Type of exam	GMPSchr 120 min.	
Responsible for module	Prof. Dr. Raimund Brotsack	
Learning content of this course:		
<ul style="list-style-type: none"> • Definition of sustainability • History of sustainability (Club of Rome, Bruntlandt, Agenda 21, Millennium Development Goals, Climate Change, ...) • Responsibility, in detail corporate social responsibility • Environmental protection and nature conservation <p>Workshop youth educational institute Windberg (20 h) The students experience, reflect and evaluate personally natural circulatory systems as a basis for transferring these experiences with regard to sustainability education in the further course of studies to resourceoriented technical circulatory systems and to evaluate the desired and undesirable effects of influencing these systems in a new, appropriate manner.</p>		
Literature:		
<ul style="list-style-type: none"> • Sustainable development goals (http://www.un.org/sustainabledevelopment/climate-change-2/) • IPCC – perspectives on climate change and sustainability: (https://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter20.pdf) • Michael Blowfield; „Business and Sustainability (Englisch)“ publischer: Oxford University Press; Auflage: New (8. Februar 2013); ISBN-10: 0199642982; ISBN-13: 978-0199642984 		
Teaching and learning methods		
seminaristic teaching / exercises / tutorials / home work Excursion: Tactile, psychological and practical experience in the framework of the "Education for Sustainable Development" methodology, followed by reflection		
Specialities (additional information)	The module is offered in cooperation with the youth educational institute Windberg.	

course name	EB4103 Certification Systems (LCA)	
Module	EB-14: Sustainability	
examination regulations	NuW-IE-B-WS18	
Course history		
major field of study	General	
Semester	4	
Weekly semester hours	2	
Credit Points (ECTS)	2	
Winter- / Summer Semester	SoSe	
Work load in hours	60 h; Attendance time: 22,5 h, Additional workload 27,5 h exam preparation 10 h	
Course Code	EB-14: Sustainability	
Teaching Language	Deutsch / Englisch	
Type of course	<input checked="" type="checkbox"/>	FWP - voluntary elective subject
	<input type="checkbox"/>	Core / optional compulsory subject
	<input type="checkbox"/>	compulsory subject – both majors
	<input type="checkbox"/>	PLV –accompanying course for internship
	<input type="checkbox"/>	SWP - compulsory elective subject
	<input type="checkbox"/>	Elective subject
Course lecturer	Prof. Dr. Bernhard Bleyer	
Type of exam	GMPSchr 120 min.	
Responsible for module	Prof. Dr. Raimund Brotsack	
Learning content of this course:	<ul style="list-style-type: none"> • The systematic approach of the Sustainable Development Goals (SDGs) • The United Nations Global Compact, the ISO 26000 and the OECD Guidelines for Multinational Enterprises as international frameworks for the assessment of sustainable development • The GRI Sustainability Reporting Standards – Its guidelines and practical experience • The VDI 4605 Evaluation of sustainability – a guidance for engineers 	
Literature	<ul style="list-style-type: none"> • R. Friedel, E. A. Sindler (Hrsg.); „Zertifizierung als Erfolgsfaktor – Nachhaltiges Wirtschaften mit Vertrauen und Transparenz“; Springer-Verlag, 2016 / ISBN: 3658097019, 9783658097011 • VDI 4605 Evaluation of sustainability. Düsseldorf 2017. • Global Reporting Initiative, G4 Sustainability Reporting Guidelines. Implementation Manual. Amsterdam 2013. • UN Global Compact, Guide to Corporate Sustainability. Shaping a Sustainable Future. New York 2014. 	
Teaching and learning methods	seminaristic teaching / exercises / tutorials / home work	
Specialities (additional information)	no	

course name	EB4104 Energy and Resource Efficiency
Module	EB-14: Sustainability
examination regulations	NuW-IE-B-WS16
Course history	
major field of study	General
Semester	4
Weekly semester hours	4
Credit Points	5
Winter- / Summer Semester	SoSe
Work load in hours	Attendance time: 45 h, Additional workload 80 h exam preparation 25 h In total: 150 h
Course Code	EB-14: Sustainability
Teaching Language	German, English
Type of course	<input checked="" type="checkbox"/> FWP - voluntary elective subject
	<input type="checkbox"/> Core / optional compulsory subject
	<input type="checkbox"/> compulsory subject – both majors
	<input type="checkbox"/> PLV – accompanying course for internship
	<input type="checkbox"/> SWP - compulsory elective subject
<input type="checkbox"/> Elective subject	
Course lecturer	Prof. Dr. Rui Li
Type of exam	GMPSchr 120 min.
Responsible for module	Prof. Dr. Raimund Brotsack
Learning content of this course	
<ul style="list-style-type: none"> • Core concepts and basic points on resource and energy management • Interactions between: energy procurement, raw material procurement, energy consumption and production planning • Technical aspects of energy and resource management, industry ratios Introductions of energy and resource management systems: e.g. DIN EN 16001 (energy management systems), ISO 50001, EMAS, VDI Guidelines 4661 (energy parameters) and 4602 (energy management), technical benefits of energy management systems. • Implementation of projects: efficiency analysis, cost-effectiveness (lifecycle costs, investment costs, manufacturing costs), project definition and implementation, operational responsibilities, employees: training and motivation • Process analysis and optimization: energy benchmarks, pinch analysis, heat integration, exergy analysis, evaluation of alternative technology • Efficiency and irreversible losses of apparatus and machinery drives, pumps, fans, blowers, compressors, filters, dryers, stirrers, heat exchangers, conveyors, Energy conversion and distribution 	
Literature	
<ul style="list-style-type: none"> • Kreith, Goswami (Editors): Handbook of Energy Efficiency and Renewable Energies • Harvery, D., 2010, Energy and the New Reality 2: Carbon-Free Energy Supply, Eathscan, London/Washington • Struchtrup, H., 2014, Thermodynamics and Energy Conversion, Springer. Heidelberg • Demirel, Y., (2nd ed.), 2016, Energy: Production, Conversion, Storage, Conservation, and Coupling 	
Teaching and learning methods	seminaristic teaching / exercises / tutorials / home work
Specialities (additional information)	no

EB-15 Plant Technology

module name	EB-15 Plant technology
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS18
modul history	
Creditpoints (ECTS)	5
Module number	EB-15
Module components (courses)	EB3104 Energy Plant Engineering EB3105 Production System Engineering
Responsible for module	Prof. Markus Hainthaler
major field of study	Engineering
Duration of module exam in min.	90 min.
Type of exam	GMPschr.
Module description	
Modul level	Bachelor
Grade weighting	5/210
Learning outcomes of this module	
Expertise	
After completing the module Plant Technology the students achieved the following learning outcomes of this module:	
<ul style="list-style-type: none"> • Understanding of thermodynamic systems and cycles • Description of state-of-the-art power plants • Understand the dimensioning and documen- tation of production plants • Understand the purpose, design and func- tion of plant equipment • Understand the systematics of a production site 	
Skills	
<ul style="list-style-type: none"> • Derive material and energy balances • Design thermodynamic cycles • Identify sources of power and production losses • Develop and draw flow-sheets • Understand process control and sources of failure • Design and calculate pipe systems • Choose and dimension plant equipment 	
Method competences:	
<ul style="list-style-type: none"> • Ability to understand and solve energy and material balances • Ability to differentiate between the different types of power plants • Ability to understand power plant compo- nents, design and operation • Ability to develop flow-sheets Ability to choose adequate plant equipment	
Usability of this course for other programs of studies	All fields of process engineering and plant de- sign
Entry requirements and recom- mended requirements	Basic knowledge of natural sciences and Engi- neering mechanics
Literature	Please see course description
Teaching and learning methods	Seminaristic teaching / exercises
Specialities (additional information)	no

course name	EB3104 Energy Plant Engineering
Module	EB-15: Plant Technology
examination regulations	NuW-IE-B-WS18
Course history	
major field of study	Engineering
Semester	3
Weekly semester hours	2
Credit Points	3
Winter- / Summer Semester	WS
Work load in hours	Attendance time: 22,5 h, additional workload: 52,5 h exam preparation: 15 h In total: 90 h
Course Code	EB3104 Energy Plant Engineering
Teaching Language	English
Responsible for module	Prof. Markus Hainthaler
Type of course	<input type="checkbox"/> FWP - voluntary elective subject
	<input type="checkbox"/> Core / optional compulsory subject
	<input checked="" type="checkbox"/> compulsory subject
	<input type="checkbox"/> PLV – accompanying course for internship
	<input type="checkbox"/> SWP - compulsory elective subject
	<input type="checkbox"/> Elective subject
Course lecturer	Prof. Rui Li
Type of exam	Module: Written exam (90 min)
Learning content of this course	<p>Thermodynamic systems:</p> <ul style="list-style-type: none"> • First and second law • Mass and Energy balances • Probability of occurrence • Pressure-volume systems • Temperature-entropy systems <p>State-of-the-art power plants:</p> <ul style="list-style-type: none"> • Components • Design and operation • Energy cycles • Power output and efficiency (gas/steam turbines etc.) • Environmental impact
Literature	Cengel and Boles, Thermodynamics: an engineering approach, 2015
Teaching and learning methods	Seminaristic teaching / exercises
Specialities (additional information)	no

course name	EB3105 Production System Engineering
Module	EB-15: Plant Technology
examination regulations	NuW-IE-B-WS18
Course history	
major field of study	Engineering
Semester	3
Weekly semester hours	2
Credit Points	2
Winter- / Summer Semester	WS
Work load in hours	Attendance time: 22,5 h additional workload: 27,5 h exam preparation 10h In total:60 h
Course Code	EB3105 Production System Engineering
Teaching Language	English
Type of course	<input type="checkbox"/> FWP - voluntary elective subject
	<input type="checkbox"/> Core / optional compulsory subject
	<input checked="" type="checkbox"/> compulsory subject
	<input type="checkbox"/> PLV – accompanying course for internship
	<input type="checkbox"/> SWP - compulsory elective subject
	<input type="checkbox"/> Elective subject
Course lecturer	Prof. Markus Hainthaler
Type of exam	Module: Written exam (90 min)
Responsible for module	Prof. Markus Hainthaler
Learning content of this course	
<p>Material balances:</p> <ul style="list-style-type: none"> • educts / products • choice of system boundary • mass, volume and mole balances • stoichiometry <p>Yield:</p> <ul style="list-style-type: none"> • Theoretical / actual yield • Conversion • Profitability <p>Flow-sheeting:</p> <ul style="list-style-type: none"> • national and international standards • block diagram, process flow diagram, piping and instrumentation diagram • process control engineering <p>Pumping/Piping Systems:</p> <ul style="list-style-type: none"> • Flow regimes • pressure drops, friction losses, suction head • power requirements • duty point curves • pump selection • pipe selection 	

Learning content of this course

Hygienic design:

- Standards and codes
- Hygienic construction
- CIP, SIP

Modes of operation:

- Batch
- Continuous

Site considerations:

- Site selection
- Site layout
- Plant layout

Literature	various authors, "Coulson and Richardson's Chemical Engineering", Vol. 1/2/6, Elsevier
Teaching and learning methods	Seminaristic teaching / exercises
Specialities (additional information)	no

EB-16 Quality Management

module name	Quality Management
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS18
modul history	
Creditpoints (ECTS)	5
Module number	EB-16
Module components (courses)	EB5106 Principles of Quality Management EB5107 Quality Methods (Six Sigma)
Responsible for module	Ibrahim Bader
major field of study	Common Elective
Duration of module exam in min.	90
Type of exam	GMPschr.
Module description	
Modul level	
Grade weighting	5/210
Learning outcomes of this module	<p>Students gain knowledge about the philosophy and basic quality management tools and are able to make use of special tools for production design and control.</p> <p>Students will also learn how to use the six sigma process improvement strategies.</p>
Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	
Literature	See course description
Teaching and learning methods	Course teaching / exercises /tutorials / home work
Specialities (additional nformation)	No

course name	Principles of Quality Management	
Module	Quality Management	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Common Elective	
Semester	5	
Weekly semester hours	2 hours lecture	
Credit Points	3	
Winter- / sommersemester	WS	
Work load in hours	90 hours: Time of attendance: 22,5 h Additional workload: 52,5 h Exam preparation: 15 h	
Course Code	EB5106	
Unterrichtssprache / Teaching Language	English	
Art des Faches / Type of course	X	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV –accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	N.N.	
Type of exam	GMPschr.	
Responsible for module	Ibrahim Bader	
Learning content of this course:	<ul style="list-style-type: none"> • Process-oriented quality management. • ISO 9000 ff. • Set-up and introduction of a quality management system. • Methods and tools of quality planning. • Total Quality Management. 	
Literature	<ul style="list-style-type: none"> • Gerhard Linß, <i>Qualitätsmanagement für Ingenieure</i>, Hanser, München-Wien • Pfeifer, <i>Praxisbuch Qualitätsmanagement</i>, Hanser, München-Wien • Mathieu Weggemann, <i>Wissensmanagement</i>, mitp-Verlag, Landsberg 	
Teaching and learning methods	Course teaching / exercises /tutorials / home work	
Specialities (additional information)	No	

course name	Quality Methods (Six Sigma)	
Module	Quality Management	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Common Elective	
Semester	5	
Weekly semester hours	2	
Credit Points	2	
Winter- / sommersemester	WS	
Work load in hours	60 hours: Time of attendance: 22,5 h Additional workload: 27,5 h Exam preparation: 10 h	
Course Code	EB5107	
Teaching Language	English	
Type of course	X	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV – accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	N.N.	
Type of exam	GMPschr.	
Responsible for module	Ibrahim Bader	
Learning content of this course	The six sigma process improvement strategy of Define, Measure, Analyze, Improve, and Control (DMAIC). Integrates and deploys statistical methods and other six sigma problem solving via the DMAIC framework.	
Literature		
Teaching and learning methods	Course teaching / exercises /tutorials / home work	
Specialities (additional information)	No	

EB-17 Human Resource Management and Labour Law

module name	Human Resource Management and Labour Law
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS16
modul history	
Creditpoints (ECTS)	5
Module number	EB-17
Module components (courses)	EB4105 Human Resource Management EB4106 Labour Law and Employee Management
Responsible for module	Prof. Dr. rer. Nat. Sascha Kreiskott
major field of study	General
Duration of module exam in min.	90 minutes
Type of exam	GMPschr.
Module description	
Modul level	Bachelor
Grade weighting	5/210

Learning outcomes of this module

Expertise

After completing the module Employee Management and Labour Law the students have achieved the following learning outcomes of this module:

- Overview about main HR processes
- Introduction into roles within a company
- Forms of employment
- Cancellation of contracts
- Introduction into relevant legal situation
- Introduction into methods of people management
- Introduction into concept self-image and public image
- Introduction into aspects of change management
- Introduction into personnel development
- Introduction into staff development
- Introduction into personality models
- Introduction into rating processes
- Introduction into relevant communication settings and their application
- Introduction into management techniques/styles
- Introduction into talent management and talent assessment
- Introduction into target setting
- Introduction into role of workers council

Skills

- First training in conducting interviews
- Writing of job profiles
- Read applications
- Cluster personality types

Method competences

- Personality models
- First training in relevant communication forms
- Conduct recruiting process

Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	
Literature	See course description
Teaching and learning methods	Course teaching / exercises / tutorials / home work
Specialities (additional information)	No

course name	Human Resource Management	
Module	Human Resource Management and Labour Law	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	General	
Semester	4	
Weekly semester hours	2 h	
Credit Points	2	
Winter- / sommersemester	SS	
Work load in hours	60 hours: Time of attendance: 22,5 h Additional workload: 27,5 h Exam preparation: 10 h	
Course Code	EB4105	
Teaching Language	English	
Type of course	<input type="checkbox"/>	FWP - voluntary elective subject
	<input type="checkbox"/>	Core / optional compulsory subject
	<input type="checkbox"/>	compulsory subject
	<input type="checkbox"/>	PLV –accompanying course for internship
	<input type="checkbox"/>	SWP - compulsory elective subject
	<input checked="" type="checkbox"/>	elective
Course lecturer	Prof. Dr. rer. Nat. Sascha Kreiskott	
Type of exam	Written examination 90 minutes	
Responsible for module	Prof. Dr. rer. Nat. Sascha Kreiskott	
Learning content of this course:		
<ul style="list-style-type: none"> • Introduction into roles within a company • Introduction into methods of people management • Introduction into concept self-image and public image • Introduction into aspects of change management • Introduction into personnel development • Introduction into personality models • Introduction into relevant communication settings and their application • Introduction into management techniques/styles 		
Literature		
<ul style="list-style-type: none"> • Herzberg, Frederick; Mausner, Bernard; Snyderman, Barbara Bloch: The Motivation to Work. • Wiley J. Marques, S. Dhiman, Engaged Leadership, Springer • Buckingham, Coffman, Erfolgreiche Führung gegen jede Regel, Campus Verlag, 3.Auflage, 2005 Malik, • Führen, Leisten, Leben - Wirksames Management für eine neue Zeit, Campus Verlag, 2006 		
Teaching and learning methods	Semenaristic teaching / exercises /tutorials / home work	
Specialities (additional information)	no	

course name	Labour Law and Employee Management
Module	Human Resource Management and Labour Law
examination regulations	NuW-IE-B-WS16
Course history	
major field of study	General
Semester	4
Weekly semester hours	2 hours lecture
Credit Points	3
Winter- / sommersemester	SS
Work load in hours	90 hours: Time of attendance: 22,5 h Additional workload: 52,5 h Exam preparation: 15 h
Course Code	EB4106
Teaching Language	English
Type of course	FWP - voluntary elective subject
	Core / optional compulsory subject
	compulsory subject
	PLV - accompanying course for internship
	SWP - compulsory elective subject
	X elective
Course lecturer	Prof. Dr. rer. Nat. Sascha Kreiskott
Type of exam	Written 90 minutes
Responsible for module	Prof. Dr. rer. Nat. Sascha Kreiskott
Lerning content of this course <ul style="list-style-type: none"> • Overview about main HR processes • Introduction into roles within a company • Forms of employment • Cancellation of contracts • Introduction into relevant legal situation • Introduction into staff development • Introduction into rating processes • Introduction into talent management and talent assessment 	
Literature <ul style="list-style-type: none"> • J. E. Pynes, Human Resources Management, Possey-Bass • J. Rowold, Human Resource Management, Springer • S. Lingemann, R. von Steinau-Steinrück, A. Mengel, Employment & Labor Law in Germany, Beck • J. Kirchner, P. Kemp, M. Magotsch, Key Aspects of German Employment and Labour Law 	
Teaching and learning methods	Seminaristic teaching / exercises /tutorials / home work
Specialities (additional information)	no

EB-18 Statistics

module name	Statistics
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS16
modul history	
Creditpoints (ECTS)	5
Module number	EB-18
Module components (courses)	EB3106 Statistics
Responsible for module	Prof. Dr. rer. nat. Raimund Brotsack
major field of study	Common Elective
Duration of module exam in min.	90 min
Type of exam	GMPschr.
Module description	
Modul level	
Grade weighting	5/210
Learning outcomes of this module	Students will acquire basic knowledge of Descriptive statistics probability theory and evaluative statistics and will be introduced to the relevant applications by means of (practice) examples.
Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	None
Literature	See course description
Teaching and learning methods	Course teaching / exercises /tutorials / home work
Specialities (additional information)	No

course name	Statistics	
Module	Statistics	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Common Elective	
Semester	3	
Weekly semester hours	4	
Credit Points	5	
Winter- / sommersemester	WS	
Work load in hours	150 hours: Time of attendance: 45 h homework: 80 h, Exam preparation: 25 h	
Course Code	EB3106	
Teaching Language	English	
Type of course	<input checked="" type="checkbox"/>	FWP - voluntary elective subject
	<input type="checkbox"/>	Core / optional compulsory subject
	<input type="checkbox"/>	compulsory subject
	<input type="checkbox"/>	PLV – accompanying course for internship
	<input type="checkbox"/>	SWP - compulsory elective subject
	<input type="checkbox"/>	elective
Course lecturer	Ibrahim Bader	
Type of exam	Written examination 90 minutes	
Responsible for module	Prof. Dr. rer. nat. Raimund Brotsack	
Learning content of this course	<ul style="list-style-type: none"> ○ Introduction/Overview ○ Descriptive statistics ○ Basic concepts of probability calculation ○ Evaluative statistics 	
Literature	<p>S. Lipschutz, J Schiller, Schaum's Outlines: Introduction to Probability and Statistics, 4th ed. MacGraw-Hill 2012</p> <p>Larose, Daniel T., Discovering statistics Third edition, Freeman 2016</p> <p>Ross, Sheldon M. Introductory statistics, 3rd ed., Academic Press, an imprint of Elsevier 2010</p>	
Teaching and learning methods	Course teaching / exercises /tutorials / home work	
Specialities (additional information)	no	

EB-19 IT in the Plant Technology

module name	IT in the Plant Technology
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS16
modul history	
Creditpoints (ECTS)	5
Module number	EB-19
Module components (courses)	EB5108 Data Communication and Processing / Industry 4.0 EB5109 Human-Machine Interaction
Responsible for module	Ibrahim Bader
major field of study	Common Elective
Duration of module exam in min.	90 min
Type of exam	GMPschr.
Module description	
Modul level	
Grade weighting	5/210
Learning outcomes of this module	<p>The module will discuss topics related to the digitalization in the future industrial plants. The module will also address how the concepts of Industry 4.0 can be applied across various industry verticals and students will be able to understand how this knowledge when integrated and implemented will shape the future workplace.</p>
Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	
Literature	See course description
Teaching and learning methods	Course teaching / exercises /tutorials / home work
Specialities (additional information)	No

course name	Data Communication and Processing / Industry 4.0												
Module	IT in the Plant Technology												
examination regulations	NuW-IE-B-WS16												
Course history													
major field of study	Common Elective												
Semester	5												
Weekly semester hours	2 hours lecture												
Credit Points	3												
Winter- / sommersemester	WS												
Work load in hours	90 hours: Time of attendance: 22,5 h Additional workload: 52,5 h Exam preparation: 15 h												
Course Code	EB5108												
Teaching Language	English												
Type of course	<table border="1"> <tr> <td>X</td> <td>FWP - voluntary elective subject</td> </tr> <tr> <td></td> <td>Core / optional compulsory subject</td> </tr> <tr> <td></td> <td>compulsory subject</td> </tr> <tr> <td></td> <td>PLV - accompanying course for internship</td> </tr> <tr> <td></td> <td>SWP - compulsory elective subject</td> </tr> <tr> <td></td> <td>elective</td> </tr> </table>	X	FWP - voluntary elective subject		Core / optional compulsory subject		compulsory subject		PLV - accompanying course for internship		SWP - compulsory elective subject		elective
X	FWP - voluntary elective subject												
	Core / optional compulsory subject												
	compulsory subject												
	PLV - accompanying course for internship												
	SWP - compulsory elective subject												
	elective												
Course lecturer	N.N.												
Type of exam	Written examination 90 minutes												
Responsible for module	Ibrahim Bader												
Learning content of this course	Students will be able to gain an in-depth understanding on the key elements of the various technical aspects and sociotechnical impact of Industry 4.0.												
Literature	Script												
Teaching and learning methods	Course teaching / exercises /tutorials / home work												
Specialities (additional information)	no												

course name	Human-Machine Interaction	
Module	IT in the Plant Technology	
examination regulations	NuW-IE-B-WS16	
Course history	IT in the Plant Technology	
major field of study	Common Elective	
Semester	5	
Weekly semester hours	2 hours lecture	
Credit Points	2	
Winter- / sommersemester	WS	
Work load in hours	60 hours: Time of attendance: 22,5 h Additional workload: 27,5 h Exam preparation: 10 h	
Course Code	EB5109	
Teaching Language	English	
Type of course	X	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV – accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	N.N.	
Type of exam	Written examination 90 minutes	
Responsible for module	Ibrahim Bader	
Learning content of this course	The six sigma process improvement strategy of Define, Measure, Analyze, Improve, and Control (DMAIC). Integrates and deploys statistical methods and other six sigma problem solving via the DMAIC framework.	
Literature	Script	
Teaching and learning methods	Course teaching / exercises /tutorials / home work	
Specialities (additional information)		

EB-20 Data Processing, Geoinformation Systems

module name	EB-20 Data Processing, Geoinformation Systems
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS16
modul history	
Creditpoints (ECTS)	5
Module number	EB-20
Module components (courses)	EB3107 Data and Signal Acquisition and Processing EB3108 Geoinformation Systems
Responsible for module	Prof. Dr. Stefan Mátéfi-Tempfli
major field of study	Common
Duration of module exam in min.	90 min
Type of exam	GMPSchr 90 min.
Module description	The module provides an introduction to data analysis, processing and scientific graphing with focus on geographic information systems, geo data capture, storage, analyses and processing.
Modul level	Bachelor
Grade weighting	5/210
<p>Learning outcomes of this module</p> <p>Expertise:</p> <ul style="list-style-type: none"> • Basics of Data Acquisition and Processing • Introduction to Signals and Systems • Discrete-Time and Linear-Time-Invariant Systems • Implementation of Data Processing Algorithms Students ... • ... can define geographic information systems, understand how they work and handle basic and specific spatial issues using the software solutions ESRI ArcGIS and QGIS. • ... learn about various geo data formats, can distinguish between them and use them depending on the application. • ... can independently capture, store, process, analyse and display geo data. • ... identify and understand spatial issues and can independently work out GIS-based solutions. <p>Personal and Social skills:</p> <ul style="list-style-type: none"> • Students jointly develop ideas and deal creatively with questions in workshops or working groups. • Team coaching: Students help each other by giving feedback and objective criticism. • Applying of theoretical concepts to practical applications. • Develop analytical thinking, attention to details and ability to consider different strategies to solve problems. • Motivation to work with Geodata and to solve spatiotemporal tasks in the field of renewable energies. <p>Method competences:</p> <ul style="list-style-type: none"> • Ability to employ software tools for scientific graphing, data analysis, processing and programming. • Develop data analysis and processing procedures. • Work with GI Systems like Google Earth, ESRI ArcGIS and QGIS. 	

Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	no
Literature	-
Teaching and learning methods	seminaristic teaching / exercises / practical work on computer / team working/ assignments / home work
Specialities (additional information)	Part of the content provided online via "Virtuelle Hochschule Bayern" (VHB).

course name	EB3107 Data and signal Acquisition and Processing	
Module	EB-20 Data Processing, Geoinformation Systems	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	common	
Semester	3	
Weekly semester hours	2	
Credit Points	2	
Winter- / sommersemester	Wintersemester	
Work load in hours	60 h Attendance time: 22,5 h, additional workload: 27,5 h exam preparation: 10 h	
Course Code	EB3107	
Teaching Language	English	
Type of course	x	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV –accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	Prof. Dr. Stefan Mátéfi-Tempfli	
Type of exam	GMPschr 90 min.	
Responsible for module	Prof. Dr. Stefan Mátéfi-Tempfli	
Learning content of this course		
Expertise:		
<ul style="list-style-type: none"> • Basics of Data Acquisition and Processing • Introduction to Discrete-Time Signals and Systems • Discrete-Time System properties, Linear-Time-Invariant Systems • Implementation of Discrete-Time Systems, Digital Filters: FIR and IIR 		
Personal and Social skills:		
<ul style="list-style-type: none"> • Analytical thinking and attention to details • Ability to consider different strategies to solve problems • Team working on applying theoretical concepts of data processing to practical applications. 		
Kompetenzen / Method competences:		
<ul style="list-style-type: none"> • Ability to develop signal processing procedures • Ability to design simple digital filters • Ability to employ scientific graphing, data analysis, data processing and programming software tools 		
Literature		
<ul style="list-style-type: none"> • Digital Signal Processing, International Edition, 4/E, John G. Proakis, Dimitris K Manolakis, Pearson 2014, ISBN 978-1-292-02573-5 • Essentials of digital signal processing using MATLAB, 3rd International ed, Vinay K. Ingle, John G. Proakis, Cengage Learning 2012, ISBN 978-1-111-42737-5 <p>Signalverarbeitung: Analoge und digitale Signale, Systeme und Filter, Martin Meyer, Springer 2014, ISBN 978-3-658-02612-7</p>		

Teaching and learning methods	seminaristic teaching / work on computer/ practical exercises and assignments / home work
Specialities (additional information)	-

course name	EB3108 Geoinformation Systems	
Module	EB-20 Data Processing, Geoinformation Systems	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Beide	
Semester	3	
Weekly semester hours	2	
Credit Points	3	
Winter- / sommersemester	Wintersemester	
Work load in hours	90 h Attendance time: 22,5 h, Additional workload: 52,5 h exam preparation 15 h	
Course Code	EB3108	
Teaching Language	English	
Type of course	x	FWP - voluntary elective
		Core / optional compulsory subject
		compulsory subject
		PLV – accompanying course for internship
		SWP - compulsory elective subject
		Elective
Course lecturer	Prof. Dr. Roland Zink / Dr. Luis Ramirez Camargo	
Type of exam	GMPschr 90 min.	
Responsible for module	Prof. Dr. Stefan Mátéfi-Templi	
Learning content of this course		
Expertise:		
<ul style="list-style-type: none"> • Introduction in Geographic information science and geographic information systems (GIS) • Geodata, especially vector and raster data • Geographic coordinate systems and projected coordinate systems • Spatial analysis and modelling, especially vector analysis like Buffer, Clip and other basic tools • Cartography and visualization • Introduction to ESRI ArcGIS 		
Students ...		
<ul style="list-style-type: none"> • ... can define geographic information systems, understand how they work and handle basic and specific spatial issues using the software solutions ESRI ArcGIS and QGIS. • ... learn about various geo data formats, can distinguish between them and use them depending on the application. • ... can independently capture, store, process, analyse and display geo data. • ... identify and understand spatial issues and can independently work out GIS-based solutions. 		
Personal and Social skills:		
<ul style="list-style-type: none"> • Studentes jointly develop ideas and deal creatively with questions in workshops or working groups. • Team coaching: Students help each other by giving feedback and objective criticism. • Motivation to work with Geodata and to solve spatio-temporal tasks in the field of renewable energies. 		

Literature	<ul style="list-style-type: none"> • Bill, R. (2016): Grundlagen der Geoinformationssysteme. Berlin. • Chang, K. (2015): Introduction to Geographic Information Systems. • ESRI Press: GIS Tutorial 1: Basic Workbook for ArcGIS 10.1. Redlands. • QGIS User Guide, web: https://docs.qgis.org/2.8/en/docs/user_manual/
Teaching and learning methods	<ul style="list-style-type: none"> • Use of Computers: Work on practical examples. • Script in form of PP-Slides • Working Groups • Short Presentation
Specialities (additional information)	<p>Part of the content is provided to students through the online course "Einführung Geoinformatik und Geoinformationssysteme" via "Virtuelle Hochschule Bayern" (VHB), which is hosted by University of Passau and Deggendorf Institute of Technology.</p>

EB-21 Energy Markets and Economic Geography

module name	EB-21 Energy Markets and Economic Geography
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS16
modul history	
Creditpoints (ECTS)	5
Module number	EB-21
Module components (courses)	EB7103 Energy Markets EB7104 Economic Geography
Responsible for module	N.N.
major field of study	Common elective
Duration of module exam in min.	90 min.
Type of exam	GMPSchr 90 min. am Ende des 7ten Semesters
Module description	The module gives an introduction to the global context of the energy industry. On the one hand, it addresses developments on the various energy markets in the world and, on the other hand, the course describes patterns of supply and globalisation. The focus is on an economic analysis. Nevertheless, there are also intersections on sustainability or climate change, which are discussed in depth in other modules.
Modul level	Bachelor
Grade weighting	5/210
Learning outcomes of this module	
Expertise: Students ... <ul style="list-style-type: none"> • ... know different energy markets like gas market, electricity market or CO2 certificate trading. • ... understand the structures, problems and challenges of these markets in the future. • ... understand global relationships and local patterns of energy supply and energy demand. 	
Skills Personal and social skills: <ul style="list-style-type: none"> • Learning and working in groups. • Active learning 	
Method competences: <ul style="list-style-type: none"> • SWOT Analysis • Site planning for energy supply • Statistics • Work with empirical data 	
Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	EB-14 Sustainability EB-25 Renewable Energies
Literature	see course description
Teaching and learning methods	<ul style="list-style-type: none"> • Active learning
Specialities (additional information)	

course name	EB7103 Energy Markets	
Module	EB21 Energy Markets and Economic Geography	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Beide	
Semester	7	
Weekly semester hours	2	
Credit Points	3	
Winter- / sommersemester	Wintersemester	
Work load in hours	90 h Attendance time: 22,5 h, additional workload: 52,5 h exam preparation: 15 h	
Course Code	EB7103	
Teaching Language	English and German	
Type of course	x	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV – accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	Prof. Dr. Roland Zink	
Type of exam	GMPschr 90 min	
Responsible for module	N.N.	
Learning content of this course		
Kenntnisse / Expertise:		
<ul style="list-style-type: none"> • Students gain insight into the energy markets of electricity, gas, oil, coal, uranium and renewable energies. • The Students understand potentials, problems and challenges of these markets and can independently develop strategies. • Students can evaluate and interpret different energy statistics. • The students know the stock exchanges for energy resources and power. • The course also addresses the global CO2 market and certificate trading. It will connect to global climate change and its costs. 		
Personal social skills:		
<ul style="list-style-type: none"> • High communication ability • Problem solving thinking 		
Method competences:		
<ul style="list-style-type: none"> • Students have to hold short presentations • Students have to familiarize themselves independently with problems. • Literature review 		
Literature	Statistic databases from <ul style="list-style-type: none"> • OECD • EU • UN • Different Journal Articles 	
Teaching and learning methods	<ul style="list-style-type: none"> • Active learning • Group work • Presentations • Statistics 	
Specialities (additional information)		

course name	EB7104 Economic Geography	
Module	EB21 Energy Markets and Economic Geography	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Beide	
Semester	7	
Weekly semester hours	2	
Credit Points	2	
Winter- / sommersemester	Wintersemester	
Work load in hours	60 h Attendance time: 22,5 h, additional workload: 27,5 h exam preparation: 10 h	
Course Code	EB7104	
Teaching Language	English and German	
Type of course	x	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV – accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	Prof. Dr. Roland Zink	
Type of exam	GMPschr 90 min.	
Responsible for module	N.N.	
Learning content of this course		
Expertise		
<ul style="list-style-type: none"> • The students understand spatial pattern of global, regional and local energy supply and demand infrastructure. • The students can calculate and evaluate technical and economical potentials of renewable Energies under a spatial perspective. • They learn site requirements for different energy technologies and understand site planning processes. • The students know global dependencies in different energy markets and understand supply structures. 		
Personal Skills		
<ul style="list-style-type: none"> • High communication ability • Problem solving thinking 		
Method competences		
<ul style="list-style-type: none"> • Students have to hold short presentations • Potential analysis • Calculate production costs • Literature review 		
Literature:		
<ul style="list-style-type: none"> • Anderson, W. P. (2012): Economic Geography. New York. • van den Bergh, J. & Bruinsma, F.R. (2012) • Brücher, W. (2009): Energiegeographie: Wechselwirkungen zwischen Ressourcen, Raum und Politik • Different Journal Articles 		
Teaching and learning methods:	<ul style="list-style-type: none"> • Active learning • Group work • Presentations • Work with computers and information systems 	
Specialities (additional information)		

EB-22 Electrical Engineering

module name	EB-22 Electrical Engineering
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS16
modul history	
Creditpoints (ECTS)	5
Module number	EB-22
Module components (courses)	EB3109 Fundamentals of Electrical Engineering
Responsible for module	Prof. Dr. Stefan Mátéfi-Tempfli
major field of study	Major Engineering
Duration of module exam in min.	90 min
Type of exam	GMPSchr 90 min.
Module description	
<p>The module provides an introduction to fundamentals of electrical engineering addressing fundamentals of electrical circuits and components; dc, ac and transient analysis of electrical circuits and networks; and application of different network theorems and calculation methods. Practical laboratory experimentations are furthermore enabling the students to acquire and consolidate the necessary theoretical knowledge as well as to develop practical skills in addressing and handling electrical circuits and equipment.</p>	
Modul level	Bachelor
Grade weighting	5/210
Moduls Learning outcomes of this module	
Expertise	
<ul style="list-style-type: none"> • Physical foundation of electrical engineering • Fundamental relations between electrical quantities • Basic components: sources, resistance, capacitor and inductor • Electrical circuits and networks • Network theorems and network analysis methods • Steady dc and ac analysis, complex representations and phasor diagrams • Transient analysis of electrical circuits 	
Personal and Social skills	
<ul style="list-style-type: none"> • Applying of theoretical concepts to practical applications. • Develop analytical thinking, attention to details and ability to consider different strategies to solve problems. 	
Method competences	
<ul style="list-style-type: none"> • Ability to apply general procedures for the analysis of electrical networks • Ability to calculate networks with sinusoidal excitations applying the complex calculation • Creation of simple circuits on experimental boards • Implementation of elementary measurements, working with instruments: multimeters, signal generators and oscilloscope. 	
Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	-
Literature	-
Teaching and learning methods	seminaristic teaching / exercises / experiments / home work
Specialities (additional information)	-

course name	EB3109 Fundamentals of Electrical Engineering	
Module	EB-22 Electrical Engineering	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Major Engineering	
Semester	3	
Weekly semester hours	4	
Credit Points	5	
Winter-/Summersemester	Wintersemester	
Work load in hours	150 h Attendance time: 60 h, Homework and other workload 45 h, exam preparation 45 h	
Course Code	EB3109	
Teaching Language	English	
Type of course	x	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV – accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	Prof. Dr. Stefan Mátéfi-Tempfli	
Type of exam	GMPschr 90 min.	
Responsible for module	Prof. Dr. Stefan Mátéfi-Tempfli	
Learning content of this course:		
<ul style="list-style-type: none"> • Physical electrical quantities, dc and ac signals • Circuit components: sources, resistors, capacitors and inductors • Circuits: series, parallel, star and delta connections • Ohm's law, electrical dc power and energy • Kirchhoff's laws • Network theorems: Thévenin, Norton, Superposition • Network analysis: mesh current and nodal voltage methods • Transient analysis using Laplace transform • AC circuits and components with sinusoidal excitation • Apparent, reactive and active ac power, power factor • Phasors and phasor diagrams • Complex representations and calculation of ac circuits • Transfer functions, logarithmic scales, Decibels and Bode-plot • Simple filters 		
Literature		
<ul style="list-style-type: none"> • Electrical Engineering: Principles and Applications, 7th International Edition, Allan R Hambley, Pearson 2018 • Hughes Electrical and Electronic Technology, 12/E, Edward Hughes, John Hiley, Ian McKenzie-Smith, Keith Brown, Pearson 2016 • Grundgebiete der Elektrotechnik 1/2, Horst Clausert, Gunther Wiesemann, Volker Hinrichsen, Jürgen Stenzel, Oldenbourg Wissenschaftsverlag 2014/2009 • Moeller Grundlagen der Elektrotechnik, 23 Auflage, Thomas Harriehausen, Dieter Schwarzenau, Springer Vieweg 2013 • Computerbased training material and experimentation systems 		
Teaching and learning methods:	Seminaristic teaching / exercises / experiments / home work	
Specialities (additional information)	-	

EB-23 Process Engineering

module name	EB-23 Process Engineering
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS16
modul history	
Creditpoints (ECTS)	5
Module number	EB-23
Module components (courses)	EB3110 Fundamentals of Process Engineering EB4107 Chemical and Biotechnological Process Engineering
Responsible for module	Prof. Markus Hainthaler
major field of study	Engineering
Duration of module exam in min.	90 min.
Type of exam	GMPschr.
Module description	
Modul level	Bachelor
Grade weighting	5/210
Learning outcomes of this module	
Expertise:	
<ul style="list-style-type: none"> • Understanding of the scientific principles of unit operations • Understanding of problems and ways of solution in production processes 	
Skills	
<ul style="list-style-type: none"> • Evaluate the advantages and disadvantages of a product treatment • Selection of the adequate unit operation • Choose the working principle of the process apparatus • Dimensioning of the process apparatus 	
Method competences:	
<ul style="list-style-type: none"> • Ability to analyze and solve a processbound problem • Ability to generate data for choice of process equipment 	
Usability of this course for other programs of studies	All fields of process engineering and plant design
Entry requirements and recommended requirements	Basic knowledge of natural sciences
Literature	Please see course description
Teaching and learning methods	Seminaristic teaching / exercises
Specialities (additional information)	no

course name	EB3110 Fundamentals of Process Engineering	
Module	EB-23: Process Engineering	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Engineering	
Semester	3	
Weekly semester hours	2	
Credit Points	2	
Winter- / sommersemester	WS	
Work load in hours	60h; Attendance time: 22,5 h, additional workload: 27,5 h exam preparation: 10h	
Course Code	EB3110 Fundamentals of Process Engineering	
Teaching Language	English	
Responsible for module	Prof. Markus Hainthaler	
Type of course	X	FWP - voluntary elective
		Core / optional compulsory subject
		compulsory subject
		PLV –accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	Prof. Markus Hainthaler	
Type of exam	Module: Written exam (90 min)	
Learning content of this course		
Mechanical Process Engineering: <ul style="list-style-type: none"> • Particulate solids: Intrinsic / extrinsic properties, particle size distribution • Mechanical separation: material balance, grade efficiency, multiphase separation • Mechanical comminution: fracture mechanics, energy utilization • Mechanical mixing: degree of mixing, mixing problems, stirring applications • Dimensional analysis: dimensionless characterization, scale-up techniques Thermal Process Engineering: <ul style="list-style-type: none"> • Evaporation / condensation: types of heat, heat balance, T-H diagram, p-H diagram, steam tables, stages of boiling • Distillation: binary mixtures, vapourliquid equilibria, azeotropes, partial pressures, fractionation, number of heat transferring units • Crystallization: solubility and saturation, nucleation, crystal growth, crystallization from solutions / melts / vapours 		
Literature	various authors, "Coulson and Richardson´s Chemical Engineering", Vol. 1/2/6, Elsevier	
Teaching and learning methods	Seminaristic teaching / exercises	
Specialities (additional information)	no	

course name	EB4107 Chemical and Biotechnological Process Engineering	
Module	EB-15: Plant Technology	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Engineering	
Semester	4	
Weekly semester hours	2	
Credit Points	3	
Winter- / sommersemester	SS	
Work load in hours	90h; Attendance time: 22,5 h, Additional workload: 52,5 h exam preparation 15h	
Course Code	EB4107 Chemical and Biotechnological Process Engineering	
Teaching Language	English	
Type of course	X	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV - accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	Prof. Markus Hainthaler	
Type of exam	Module: Written exam (90 min)	
Responsible for	Prof. Markus Hainthaler	
Learning content of this course		
<p>Chemical Process Engineering:</p> <ul style="list-style-type: none"> • Reactor design: Products and by-products, reactor types, chemical kinetics, conversion rates, Batch reactors, tubular-flow reactors, stirred-tank reactors • Gas-solid reactions: Diffusivity, catalyst reactions, isothermal reactions, selectivity, rate-determining steps • Gas-liquid reactions: reactor types, agitated tanks <p>Biotechnological Process Engineering:</p> <ul style="list-style-type: none"> • Classification of microorganisms: taxonomy and species, environmental conditions • Metabolism: composition of cells, enzyme kinetics, strain improvement • Bioreactors: Immobilisation, fermentation, utilities, aseptic operation, yield 		
Literature	various authors, "Coulson and Richardson's Chemical Engineering", Vol. 1/3/6, Elsevier	
Teaching and learning methods	Seminaristic teaching / exercises	
Specialities (additional information)	no	

EB-24 Design Engineering and Materials Science

module name	EB-24 Design Engineering and Materials Science
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS16
modul history	
Creditpoints (ECTS)	5
Module number	EB-15
Module components (courses)	EB3111 Design Engineering EB3105 Materials Science
Responsible for module	Prof. Markus Hainthaler
major field of study	Engineering
Duration of module exam in min.	90 min.
Type of exam	GMPschr.
Module description	
Modul level	Bachelor
Grade weighting	5/210
Learning outcomes of this module	
<p>Expertise: After completing the module Design Engineering and Materials Science, the students achieved the following learning outcomes of this module:</p> <ul style="list-style-type: none"> • Understand the structure, composition, processing, properties and performance of different families of materials and relationship among them • Understand and generate basic Technical Drawings in 2D and 3D • Understand the function and design of common machine parts 	
<p>Skills:</p> <ul style="list-style-type: none"> • Understanding of structure – property relationship of materials • Basic skill to select appropriate materials in different fields of engineering • Basic skills to calculate material properties • Fundamental skill of corrosion in different material classes • Drawing of isometric and 2D technical drawings • Understand the relationships between 2D and 3D visualization • Draw complex objects by geometric constructions • Analyze stresses and loads on machine parts • Predict failure of a machine component • Dimension and calculate fasteners and bearings 	
<p>Method competences:</p> <ul style="list-style-type: none"> • Basic knowledge of standardized tests to evaluate properties and performance of materials • Ability to analyze and solve a visualization problem • Ability to create machine parts for engineering applications • Ability to evaluate mechanical failure sources 	
Usability of this course for other programs of studies	All fields of mechanical engineering
Entry requirements and recommended requirements	Basic knowledge of natural sciences, geometry and engineering mechanics
Literature	Please see course description
Teaching and learning methods:	Seminaristic teaching / exercises
Specialities (additional information)	no

course name	EB3111 Design Engineering	
Module	EB-24 Design Engineering and Materials Science	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Engineering	
Semester	3	
Weekly semester hours	2	
Credit Points	3	
Winter- / sommersemester	WS	
Work load in hours	90h; Attendance time: 22,5 h Additional workload: 52,5 h exam preparation: 15h	
Course Code	EB-24 Design Engineering and Materials Science	
Teaching Language	English	
Responsible for module	Prof. Markus Hainthaler	
Type of course	X	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV - accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	Prof. Markus Hainthaler	
Type of exam	Written exam (90 min)	
Learning content of this course:		
Technical drawing:		
<ul style="list-style-type: none"> National and international standards of Technical drawings Isometric projection: normal objects, box construction, non-isometric and curved shapes Geometric construction: angles, parallels, tangents, circles, arcs, bisections, geometric objects, complex objects Orthographic projection: generation of views, missing view problems, normal and inclined faces, curved faces 		
Machine component design:		
<ul style="list-style-type: none"> Elastic / plastic deformation Threaded fasteners: stresses and loads, types, initial tensile force, tightening torque Static body stresses: description of single stresses, Mohr circle representation, combination of stresses, analytical and graphical evaluation Failure Analysis: Safety factors, failure theories, graphical representation Lubrication: types of friction, types of lubricants Bearings: stresses and loads, types, risks of failure 		
Literature	<ul style="list-style-type: none"> Giesecke, Mitchell et al. "Technical drawing with engineering graphics" Juvinall, Marshek "Machine Component Design" 	
Teaching and learning methods	Seminaristic teaching / exercises	
Specialities (additional information)	no	

course name	EB3111 Materials Science	
Module	EB-24: Design Engineering and Materials Science	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Engineering	
Semester	3	
Weekly semester hours	2	
Credit Points	2	
Winter- / sommersemester	WS	
Work load in hours	60h; Attendance time: 22,5 h Additional workload: 27,5 h exam preparation 10 h	
Course Code	EB3111 Materials Science	
Teaching Language	English	
Type of course	X	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV - accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	Prof. Thorsten Gerdes	
Type of exam	Module: Written exam (90 min)	
Responsible for module	Prof. Markus Hainthaler	
Learning content of this course		
<ul style="list-style-type: none"> • General material properties: classification, applications and selection criteria, bonding in solids, phase diagrams • Mechanical properties fundamentals: stress and strain, Hooke´s law, strength, hardness • metals: steel, light alloys, copper alloys; processing, properties and applications • ceramics: processing, properties and applications of oxides, nitride and carbides • glass: structure, processing, properties and applications of silicate glasses • polymers: structure, properties and applications • composite materials: structure, processing, properties and applications 		
Literature	William D. Callister Jr., David G. Rethwisch, Materials Science and Engineering: An Introduction, 2013	
Teaching and learning methods	Seminaristic teaching / exercises	
Specialities (additional information)	no	

EB-25 Renewable Energies

module name	EB-25 Renewable Energies
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS16
modul history	
Creditpoints (ECTS)	5
Module	EB-25
Module components (courses)	EB3113 Fundamentals of Renewable Energies EB4108 Renewable Energy Systems
Responsible for module	Prof. Dr. Raimund Brotsack
major field of study	General
Duration of module exam in min.	90 min.
Type of exam	GMPschr 90min.
Module description	
Modul level	Bachelor
Grade weighting	5/210
Learning outcomes of this module	
Expertise:	
Teaching basic knowledge about energy, forms of energy and performance, climate change - greenhouse effect, processes in the atmosphere as well as the basics of bio-energy (plants, photosynthesis, chemical building blocks), the finite nature of fossil resources and the fundamentals for the evaluation of renewable energy systems - sustainability, selected technologies of renewable energy systems and energy storage research	
Skills :	
The acquired knowledge forms the basis for understanding the challenges in relation to the conversion of energy systems. Calculation examples enhance the knowledge	
Method competences:	
The students should acquire basic knowledge in the field of regenerative forms of energy (source, origin, development, chemical structure of biogenic energy sources) and improve this knowledge based on real case studies. The students should be enabled to apply the acquired knowledge and to critically evaluate and inter-present subject-specific information on the basis of chemical and physical basics	
Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	no
Literature	See course description
Teaching and learning methods	seminaristic teaching / exercises / tutorials / home work
Specialities (additional information)	no

course name	EB3113 Fundamentals of Renewable Energies	
Module	EB-25: Renewable Energies	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	General	
Semester	3	
Weekly semester hours	2	
Credit Points	2	
Winter- / Sommersemester	WS	
Work load in hours	60 h; Attendance time: 22,5 h, Additional workload: 27,5 h exam preparation: 10 h	
Course Code	EB3113 Fundamentals of Renewable Ener- gies	
Teaching Language	Deutsch / Englisch	
Type of course	<input type="checkbox"/>	FWP - voluntary elective subject
	<input type="checkbox"/>	Core / optional compulsory subject
	<input checked="" type="checkbox"/>	compulsory subject – both majors
	<input type="checkbox"/>	PLV –accompanying course for internship
	<input type="checkbox"/>	SWP - compulsory elective subject
	<input type="checkbox"/>	elective
Course lecturer	Prof. Dr. Raimund Brotsack	
Type of exam	GMPschr 90 min	
Responsible for module	Prof. Dr. Raimund Brotsack	
Learning content of this course		
<ul style="list-style-type: none"> • Basics about energy - forms of energy / power • Sources of renewable energies: solar energy - light, geothermal energy, gravitation - tides • finiteness of fossil resources • Chemistry of the atmosphere, climate, climate change • Sustainability and assessment criteria for renewable energy systems 		
Literature		
<ul style="list-style-type: none"> • Godfrey Boyle; „Renewable Energy“, 3rd. Edition (13. September 2012), Oxford University Press; ISBN-10: 0199545332; ISBN-13: 978- 0199545339 • Andy Mccrea; „Renewable Energy“; neue Auflage (18. Februar 2013); The Crowood Press Ltd; ISBN-10: 1847974791; ISBN-13: 978- 1847974792 • Quaschnig V.: „Regenerative Energie-systeme“, 9. Auflage; Hanser Verlag München; 8. 2015 • Wesselak, V.; Schabbach, T., et al.; „Regenerative Energietechnik“; Springer Verlag Berlin Heidelberg, 2te Auflage 2013 		
Teaching and learning methods	seminaristic teaching / exercises / tutorials / home work	
Specialities (additional information)	no	

course name	EB4108 Renewable Energy Systems	
Module	EB-25: Renewable Energies	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	General	
Semester	4	
Weekly semester hours	2	
Credit Points	3	
Winter- / sommersemester	SS	
Work load in hours	90 h; Attendance time: 22,5 h, inkl. Excursion Additional workload: 52,5 h exam preparation 15 h	
Course Code	EB41008 Renewable Energy Systems	
Teaching Language	Deutsch / Englisch	
Type of course	<input type="checkbox"/>	FWP - voluntary elective subject
	<input type="checkbox"/>	Core / optional compulsory subject
	<input checked="" type="checkbox"/>	compulsory subject – both majors
	<input type="checkbox"/>	PLV - accompanying course for internship
	<input type="checkbox"/>	SWP - compulsory elective subject
Course lecturer	Prof. Dr. Rui Li	
Type of exam	GMPschr 90 min.	
Responsible for module	Prof. Dr. Raimund Brotsack	
Learning content of this course		
<ul style="list-style-type: none"> • energy conservation and recovery • energy storage and regulation • water power, hydroelectric power stations, and storage power stations; tidal power stations; solar power: thermal solar power stations, photovoltaic energy conversion; wind power: operation of wind farms, solar chimney power stations; geo-thermal energy; bioenergy • sector coupling between renewable energy resource and the electric grid • "Energiewende" in Germany • energy supply in the near future and future perspectives 		
Literature		
<ul style="list-style-type: none"> • Kaltschmitt, M., Streicher, W., Wiese, A. (eds.), 2007, Renewable Energy: Technology, Economics and Environment, Springer. • Heidelberg Harvery, D., 2010, Energy and the New Reality 2: Carbon-Free Energy Supply, Eathscan, London/Washington • Boyle, G. (ed.) 2004, Renewable Energy: Power for a Sustainable Future, 2nd Edition, Open University Press, Oxford • Struchtrup, H., 2014, Thermodynamics and En- ergy Conversion, Springer. Heidelberg • Demirel, Y., (2nd ed.), 2016, Energy: Produc- tion, Conversion, Storage, Conservation, and Coupling 		
Teaching and learning methods	seminaristic teaching / exercises / tutorials / home work	
Specialities (additional information)	no	

EB-26 Energy Technology

module name	EB-26 Energy technology
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS16
modul history	
Creditpoints (ECTS)	5
Module number	EB-26
Module components (courses)	EB5110 Fluid and Energy Technology EB5111 Conventional Energy Technology
Responsible for module	Prof. Rui Li
major field of study	Engineering
Duration of module exam in min.	90 min.
Type of exam	GMPschr.
Module description	
Modul level	Bachelor
Grade weighting	5/210
Learning outcomes of this module	
<p>Expertise: After completing the module Energy Technology the students achieved the following learning outcomes of this module:</p> <ul style="list-style-type: none"> • Understand the different types and behaviour of fluids • Understand the energy content of fluids • Understand the principles of energy and heat transfer • Understand conventional energy options and issues of supply and demand • Analyze the energy cycles with calculations on power and work • Perform thermodynamics and efficiency calculations • Understand "Energiewende" and its status in Germany 	
<p>Fertigkeiten / Skills</p> <ul style="list-style-type: none"> • Describe the molecular properties of a fluid • Describe the sources of energy within a fluid • Identify the sources of energy losses of a fluid • Design different apparatuses for heat transfer • Describe energy transfer in conventional energy plants 	
<p>Kompetenzen / Method competences:</p> <ul style="list-style-type: none"> • Ability to derive and solve energy balances • Ability to calculate heat transfer behavior • Ability to draw power cycle e.g. a steady-flow Carnot engine • Ability to derivate the efficiency of power cycles • Ability to compare different types of energy 	
Usability of this course for other programs of studies	All fields of process engineering and plant design
Entry requirements and recommended requirements	Basic knowledge of natural sciences, process engineering and energy balances
Literature	Please see course description
Teaching and learning methods	Seminaristic teaching / exercises
Specialities (additional information)	no

course name	EB5110 Fluid and Energy Technology												
Module	EB-26: Energy Technology												
examination regulations	NuW-IE-B-WS16												
Course history													
major field of study	Engineering												
Semester	5												
Weekly semester hours	2												
Credit Points	3												
Winter- / sommersemester	WS												
Work load in hours	90h; Attendance time: 22,5 h additional workload: 52,5 h exam preparation: 15 h												
Course Code	EB5110 Fluid and Energy Technology												
Teaching Language	English												
Responsible for module	Prof. Rui Li												
Type of course	<table border="1"> <tr> <td>X</td> <td>FWP - voluntary elective subject</td> </tr> <tr> <td></td> <td>Core / optional compulsory subject</td> </tr> <tr> <td></td> <td>compulsory subject</td> </tr> <tr> <td></td> <td>PLV - accompanying course for internship</td> </tr> <tr> <td></td> <td>SWP - compulsory elective subject</td> </tr> <tr> <td></td> <td>elective</td> </tr> </table>	X	FWP - voluntary elective subject		Core / optional compulsory subject		compulsory subject		PLV - accompanying course for internship		SWP - compulsory elective subject		elective
X	FWP - voluntary elective subject												
	Core / optional compulsory subject												
	compulsory subject												
	PLV - accompanying course for internship												
	SWP - compulsory elective subject												
	elective												
Course lecturer	Prof. Markus Hainthaler												
Type of exam	Module: Written exam (90 min)												
Learning content of this course	<p>Energy and Momentum relationships:</p> <ul style="list-style-type: none"> • Types of fluids (liquids, ideal and non-ideal gases) • Rheology (viscosity, Newtonian, Non-Newtonian) • Compressible/incompressible fluids • Internal Energy, Bernoulli equation <p>Flow of liquids:</p> <ul style="list-style-type: none"> • Laminar / turbulent flow • Boundary layers • Friction losses • Viscoelastic behaviour <p>Heat transfer:</p> <ul style="list-style-type: none"> • Conduction / convection / radiation • Jacketed vessels • Heat exchangers 												
Literature	Coulson, Richardson "Chemical Engineering", Vol. 1												
Teaching and learning methods	Seminaristic teaching / exercises												
Specialities (additional information)	no												

course name	EB5111 Conventional Energy Technology	
Module	EB-26: Energy Technology	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Engineering	
Semester	5	
Weekly semester hours	2	
Credit Points	2	
Winter- / sommersemester	WS	
Work load in hours	60h; Attendance time: 22,5 h, Additional workload: 27,5 h exam preparation 10 h	
Course Code	EB5111 Conventional Energy Technology	
Teaching Language	English	
Type of course	X	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV - accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	Prof. Rui Li	
Type of exam	Module: Written exam (90 min)	
Responsible for module	Prof. Rui Li	
Learning content of this course		
<ul style="list-style-type: none"> • Energy conversion and transfer methods • Fossil fuel conversion, power cycles, combined cycles • Nuclear energy , current status and others • Climate change impact on science, economics and policy 		
Literature		
<ul style="list-style-type: none"> • Y. Demirel, Energy: Production, Conversion, Storage, Conservation, and Coupling, (2nd ed.) • Y. A. Çengel, Thermodynamics: An Engineering Approach, (5th ed) 		
Teaching and learning methods	Seminaristic teaching / exercises	
Specialities (additional information)	no	

EB-27 Measurement and Control Engineering

module name	EB-27 Measurement and Control Engineering
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS16
course history	
Creditpoints (ECTS)	10
Module number	EB-27
Module components (courses)	EB4109 Fundamentals of Measurement and Control Engineering EB5112 Applied Measurement Engineering with exercises EB5113 Applied Control Engineering with exercises
Responsible for module	Prof. Dr. Stefan Mátéfi-Tempfli
major field of study	Major Engineering
Duration of module exam in min.	120 min
Type of exam	GMPSchr 120 min.
Module description	<p>The module provides an introduction to fundamentals of measurement and control engineering and to the application of the respective engineering concepts and methods through providing specialized courses, exercises and practical training.</p> <p>The teaching and training material relies on professional computer-based training and experimentation system where multimedia combines cognitive and hands-on training units into a comprehensive unified concept enabling students to acquire theoretical building blocks, skills in handling equipment, advanced training and maximum learning effectiveness.</p>
Modul level	Bachelor
Grade weighting	10/210
Learning outcomes of this module	<p>Expertise:</p> <ul style="list-style-type: none"> • Fundamentals of measuring physical quantities • Measuring methods, devices and instruments • Measurement of electrical and non-electrical quantities • Analysis and processing of measurement results • Fundamentals of control systems • Mathematical modelling of control systems • Control systems analysis and design using various different methods <p>Personal and Social skills:</p> <ul style="list-style-type: none"> • Applying of theoretical concepts to practical applications. • Ability to work in team for developing different strategies to solve problems. <p>Kompetenzen / Method competences:</p> <ul style="list-style-type: none"> • Measurement and analysis of various physical signals and quantities. • Employment of basic measurement instruments • Ability to employ software tools for measurement data analysis, processing and programming. • Characterisation of controlled systems based on their static and dynamic responses • Design and operation of a closed-loop controllers, PID controllers and its sub-classes.
Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	Recommended: fundamental knowledge in physics and electrical engineering
Literature	-
Teaching and learning methods	seminaristic teaching / work on computer/ practical exercises and assignments / home work
Specialities (additional information)	

course name	EB4109 Fundamentals of Measurement and Control Engineering	
Module	EB-27 Measurement and Control Engineering	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Major Engineering	
Semester	4	
Weekly semester hours	4	
Credit Points	5	
Winter- / sommersemester	Summer semester	
Work load in hours	150 h Attendance time: 60 h, Homework and other workload: 45 h, exam preparation: 45 h	
Course Code	EB4109	
Teaching Language	English	
Type of course	X	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV - accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	Prof. Dr. Stefan Mátéfi-Tempfli	
Type of exam	GMPschr 120 min.	
Responsible for module	Prof. Dr. Stefan Mátéfi-Tempfli	
Learning content of this course		
<ul style="list-style-type: none"> • Measurement parameters, unit systems, standards • Signals, characterisation, conversion • Measuring methods • Measuring devices, basic instruments • Evaluation of measurement results, errors and uncertainties • Measurement of electrical quantities • Measurement of non-electrical physical quantities • Analog and digital procedures • Reliability measurements • Introduction to control systems • Mathematical modelling of control systems • Modelling of mechanical, electrical, fluid and thermal systems • Transient and steady-state response analyses • Control systems analysis and design, root-Locus method • Frequency-response methods • PID controllers and modified PID controllers • Control systems analysis and design in state space 		
Literature		
<ul style="list-style-type: none"> • Messtechnik: Grundlagen und Anwendungen der elektrischen Messtechnik, Ausgabe 8, Parthier R., Springer 2016 • Modern Measurements: Fundamentals and Applications, A. Ferrero, D. Petri, P. Carbone, M. Catelani, Wiley 2015 • Electrical Measurements in the Laboratory Practice, Bartiromo R., De Vincenzi M., Springer 2016 • Modern Control Engineering, 5th Edition, Katsuhiko Ogata, Pearson 2010 • Modern Control Systems, 13th Edition, Richard C. Dorf, Robert, H. Bishop, Pearson 2017 • The Control Handbook, 2nd Edition (3 volume set: Control System Fundamentals; Control System Applications; Control System Advanced Methods), William S. Levine, CRC Press 2010 		
Teaching and learning methods	seminaristic teaching / exercises / home work	
Specialities (additional information)	-	

course name	EB5112 Applied Measurement Engineering with exercises	
Module	EB-27 Measurement and Control Engineering	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Major Engineering	
Semester	5	
Weekly semester hours	2	
Credit Points	5/2	
Winter- / sommersemester	Wintersemester	
Work load in hours	75 h Attendance time: 30 h, other workload 25 h, exam preparation 15 h	
Course Code	EB5112	
Teaching Language	English	
Type of course	X	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV - accompanying course for internship
		SWP - compulsory elective subject
		Elective
Course lecturer	Prof. Dr. Stefan Mátéfi-Tempfli	
Type of exam	GMPschr 120 min.	
Responsible for module	Prof. Dr. Stefan Mátéfi-Tempfli	
Learning content of this module:		
<ul style="list-style-type: none"> • Measurement of electrical and non-electrical quantities • Analog and digital measurements • Recording characteristics, dynamic response, linearization • Measurements of current and voltage • Measurement of apparent, reactive and active power • Measuring electrical work • Measuring frequency • Temperature measurement • Pressure measurement • Force and torque measurement • Analysis of measurement results, statistics, fitting 		
Literature		
<ul style="list-style-type: none"> • Messtechnik: Grundlagen und Anwendungen der elektrischen Messtechnik, Ausgabe 8, Parthier R., Springer 2016 • Modern Measurements: Fundamentals and Applications, A. Ferrero, D. Petri, P. Carbone, M. Catelani, Wiley 2015 • Electrical Measurements in the Laboratory Practice, Bartiromo R., De Vincenzi M., Springer 2016 • Computer-based training material and experimentation systems 		
Teaching and learning methods	seminaristic teaching / work on computer/ practical exercises and assignments / home work	
Specialities (additional information)	-	

course name	EB5113 Applied Control Engineering with exercises	
Module	EB-27 Measurement and Control Engineering	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Major Engineering	
Semester	5	
Weekly semester hours	2	
Credit Points	5/2	
Winter- / sommersemester	Wintersemester	
Work load in hours	75 h Attendance time: 30 h, other workload 25 h, exam preparation 15 h	
Course Code	EB5113	
Teaching Language	English	
Type of course	x	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV - accompanying course for internship
		SWP - compulsory elective subject
		Elective
Course lecturer	Prof. Dr. Stefan Mátéfi-Tempfli	
Type of exam	GMPschr 120 min.	
Responsible for module	Prof. Dr. Stefan Mátéfi-Tempfli	
Learning content of this course		
<ul style="list-style-type: none"> • Principles of open- and closed-loop control technology • Characterisation of controlled systems based their static and dynamic responses • Control loops with discontinuous controllers • Design and operation of a PID controller and its sub-classes • Structure of the closed control loop, assessment of responses to set-point changes and disturbance variables • Practical exercises and applications in: <ul style="list-style-type: none"> ▪ automatic temperature control ▪ closed-loop speed control of an electrical drive ▪ closed-loop control of illumination intensity in a room ▪ automatic liquid level and flow rate control ▪ programmable logic control systems 		
Literature		
<ul style="list-style-type: none"> • Modern Control Engineering, 5th Edition, Katsuhiko Ogata, Pearson 2010 • Modern Control Systems, 13th Edition, Richard C. Dorf, Robert H. Bishop, Pearson 2017 • The Control Handbook, 2nd Edition (3 volume set: Control System Fundamentals; Control System Applications; Control System Advanced Methods), William S. Levine, CRC Press 2010 • Computer-based training material and experimentation systems 		
Teaching and learning methods	seminaristic teaching / work on computer/ practical exercises and assignments / home work	
Specialities (additional information)	-	

EB-28 Lab Work

module name	Lab Work
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS16
modul history	3. Semester: Chemistry/Biology 4. Semester: Physics
Creditpoints (ECTS)	5
Module number	EB 28
Module components (courses)	Lab Work in Chemistry/Biology Lab Work in Physics
Responsible for module	Prof. Dr. rer. Nat. Sascha Kreiskott
major field of study	Engineer
Duration of module exam in min.	-
Type of exam	Written composition
Module description	After completing the module Lab Work, the students achieved the following learning outcomes of this module: The students demonstrate a general understanding of the structural working processes in a scientific laboratory.
Modul level	Bachelor
Grade weighting	2,38%
Learning outcomes of this module	
<p>Expertise The students demonstrate a general understanding of the basic principles of the relevant scientific sub-disciplines and are able to discuss these principles in terms of modern industrial operations.</p> <p>Personal skills The students learn to experiment under supervision.</p> <p>Social skills Ability to work in groups and communicate their progress and results.</p> <p>Method competences</p> <ul style="list-style-type: none"> • Chemistry/Biology: Experiments about the basic knowledge of chemical characteristics and inorganic and organic reaction behaviours. Basic knowledge about biology with experiments to the antimicrobial effect and microscopy. • Physics: Experiment about the basic concepts of mechanics, optics and thermodynamics. Introduction into physical measurement techniques. Hands-on training in setting up physical experiments. Introduction and application into error propagation concepts. 	
Usability of this course for other programs of studies	Planning and structural work in a scientific Laboratory
Entry requirements and recommended requirements	Recommended: Fundamentals of biology, chemistry and physics
Literature	See courses
Teaching and learning methods	Lecture and practical training
Specialities (additional information)	-

course name	Lab Work in Chemistry/Biology	
Module	EB 28 Lab Work	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Engineer	
Semester	3	
Weekly semester hours	2	
Credit Points	3	
Winter- / summersemester	WS	
Work load in hours	90 h Attendance time: 22,5 h additional workload: 67,5 h	
Course Code	EB 3114	
Teaching Language	English	
Type of course	X	FWP voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV - accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	Prof. Dr. rer. nat. Raimund Brotsack	
Type of exam	Written composition	
Responsible for module	Prof. Dr. rer. Nat. Sascha Kreiskott	
Learning content of this course		
Expertise		
<p>After completing the module Lab Work in Chemistry/Biology, the students achieved the following learning outcomes of this module: The students demonstrate a general understanding of the structural work in a scientific Laboratory, especially by the handling with chemical devices and microscopes. The student is able to work safely in a chemical laboratory and understands the basics in inorganic and organic chemistry as well as biology.</p>		
Personal skills		
The students learn to experiment under supervision		
Social skills		
The students work in groups on chemical and biological topics and communicate their progress and results.		
Method competences		
<ul style="list-style-type: none"> • Stoichiometry: Experiments to get familiar with stoichiometric ratio on the example of calcium compounds. • Solubility: Basic knowledge about solubility products taught by the hardness of water and the solubility of carbon dioxide in water. • Protolysis: Protolysis behaviour of acids and alkalis in buffered and not buffered systems. • Redox reactions: Experiments to get familiar with oxidation and deoxidation by the example of the reaction behaviour of copper and aluminium with several chemicals. • Organic chemistry: basic groups of organic compounds (alkane, alkene, alkynes, alcohols, carbon acids, aldehydes, ketones and esters) with several experiments (e.g. reaction of aldehydes with copper and silverions, saponification of olive oil...). • Microbiological contact test: Observing the antimicrobial effect of several materials with contact plates. • Fundamentals of metabolism: Observing the metabolism by the example of glycolysis. 		

Literature

- W. Gerhartz; Ullman´s encyclopedia of industrial chemistry; Wiley & Sons
- K.H. Büchel et al.; Industrielle Anorganische Chemie; Wiley - VCH
- K. Weissermel, H.-J. Arpe; Industrielle Organische Chemie; Wiley - VCH
- Reece, Jane B. et al. (2016). Campbell Biology 10th ed. Pearson, London (ISBN 0134093410)
- Reece, Jane B. et al. (2016). Campbell Biology 10th ed. Pearson, London (ISBN 0134093410)

Teaching and learning methods

Lecture and practical training

Specialities (additional information)

-

course name	Lab Work in Physics	
Module	EB 28 Lab Work	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Engineer	
Semester	4	
Weekly semester hours	2	
Credit Points	2	
Winter- / summersemester	SS	
Work load in hours	60 hours Attendance time: 22,5 h Additional workload: 37,5 h	
Course Code	EB 4110	
Teaching Language	English	
Type of course	X	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV - accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	Prof. Dr. rer. Nat. Sascha Kreiskott	
Type of exam	Written composition	
Responsible for module	Prof. Dr. rer. Nat. Sascha Kreiskott	
Learning content of this course		
Expertise:		
<p>After completing the module Lab Work in Physics, the students achieved the following learning outcomes of this module:</p> <p>The students demonstrate a general understanding of the structural work in a scientific Laboratory. They have learned how to setup and perform experiments and measurements. The students are able to work safely in a laboratory environment and understands the basics in mechanics, optics and thermodynamics. The students have learned the concepts of error propagation and their application. The students have learned how to write lab reports.</p>		
Personal skills		
The students learn to perform physical experiments under supervision.		
Social skills		
The students work in groups on mechanical, optical and thermodynamics topics and communicate their progress and results.		

Method competences

- **Mechanics:** Apply Newton's second law to measure weight and earth's free fall acceleration.
- **Thermodynamics:** Measure the behaviour of ideal gases if temperature changes. Boyle law.
- **Heat capacity:** Measure the heat capacity of several substances.
- **Pendulum:** Measure frequency and its dependence on amplitude and length of a pendulum. Calculate free fall acceleration.
- **Moment of Inertia:** Measurements of moments of inertia of different setups via oscillations.
- **Optical instruments:** Setup of basic optical instruments with lenses and measurement of specific properties (such as focal length, magnification etc.).
- **Error propagation:** Learn and apply the concepts how errors in the measurement propagate into calculated results.

Literature	J. Walker, D. Halliday, R. Resnick, Principles of Physics, Wiley
Teaching and learning methods	Lecture and practical training
Specialities (additional information)	no

EB-29 Process Reliability and Work Safety

module name	Process Reliability and Work Safety
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS16
modul history	
Creditpoints (ECTS)	5
Module number	EB-29
Module components (courses)	EB4111 Process Reliability EB4112 Work Safety
Responsible for module	Prof. Dr. rer. nat. Raimund Brotsack
major field of study	Engineering
Duration of module exam in min.	90
Type of exam	GMPschr.
Module description	
Module level	Bachelor
Grade weighting	5/210
Learning outcomes of this module	Gives an understanding of the qualitative and quantitative techniques that are used in the reliability, availability and maintainability analysis of all types of engineering systems. Also understanding the significance of healthy and safe working environment of employees for the purpose of enhancing workers' productivity.
Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	None
Literature	See course description
Teaching and learning methods	Course teaching / exercises /tutorials / home work
Specialities (additional information)	None

course name	Process Reliability
Module	Process Reliability and Work Safety
examination regulations	NuW-IE-B-WS16
Course history	
major field of study	Engineering
Semester	5
Weekly semester hours	2 hours lecture
Credit Points	3
Winter- / summersemester	SS
Work load in hours	90 h Time of attendance: 22,5 h Additional workload: 52,5 h Exam preparation: 15 h
Course Code	EB4111
Teaching Language	English
Type of course	<input checked="" type="checkbox"/> FWP - voluntary elective subject
	<input type="checkbox"/> Core / optional compulsory subject
	<input type="checkbox"/> compulsory subject
	<input type="checkbox"/> PLV - accompanying course for internship
	<input type="checkbox"/> SWP - compulsory elective subject
	<input type="checkbox"/> elective
Course lecturer	Prof. Dr. Rui Li
Type of exam	GMPSchr 90 min
Responsible for module	Prof. Dr. rer. nat. Raimund Brotsack
Learning content of this course	
<ul style="list-style-type: none"> • Process-oriented quality management • ISO 9000 ff. • Set-up and introduction of a quality management system • Methods and tools of quality planning • Total Quality Management 	
Literature	Evans, J.R. and Lindsay, W.M., The Management and Control of Quality, South-Western, (latest ed.)
Teaching and learning methods	seminaristic teaching / exercises / tutorials / home work
Specialities (additional information)	no

course name	Work Safety	
Module	Process Reliability and Work Safety	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Engineering	
Semester	5	
Weekly semester hours	2	
Credit Points	2	
Winter- / summersemester	SS	
Work load in hours	60 hours: Time of attendance: 22,5 h Additional workload: 27,5 h Exam preparation: 10 h	
Course Code	EB4112	
Teaching Language	English	
Type of course	X	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV - accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	N.N.	
Type of exam	GMPSchr 90 min	
Responsible for module	Prof. Dr. rer. nat. Raimund Brotsack	
Learning content of this course		
Understanding the significance of healthy and safe working environment of employees for the purpose of enhancing workers' productivity. This will specifically enable them to, recruit or propose qualified safety coordinators with highlevel responsibility and authority, regularly review safety activity results against predetermined objectives, evaluate organizational supervisors based on the safety performance of their employees, Provide financial support for safety programs, and give alert on unhealthy and unsafe environment.		
Literature	Script	
Teaching and learning methods	Course teaching / exercises /tutorials / home work	
Specialities (additional information)	no	

EB-30 Process Optimization

module name	EB-30 Process Optimization
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS16
modul history	
Creditpoints (ECTS)	5
Module number	EB-30
Module components (courses)	EB7105 LEAN-Management (Value Stream Mapping) and FMEA EB7106 Process Optimization in Control and Systems Engineering
Responsible for module	Prof. Markus Hainthaler
major field of study	Engineering
Duration of module exam in min.	90 min.
Type of exam	GMPschr.
Module description	
Modul level	Bachelor
Grade weighting	5/210
Learning outcomes of this module	
Expertise	
After completing the module Process Optimization the students achieved the following learning outcomes of this module:	
<ul style="list-style-type: none"> • Understand the principles of efficient working processes in theory and practice • Understand economical and technical sources for optimization • Understand life cycles and value streams in production processes • Understand the risks of future projection 	
Skills	
<ul style="list-style-type: none"> • Analyse of the customer´s needs, the status quo and the future state • Decide between several optimization methods • Identify essential and wasted process steps 	
Kompetenzen / Method competences:	
<ul style="list-style-type: none"> • Ability to recognize optimization potentials • Ability to initiate optimization programmes • Ability to simplify complex production systems 	
Usability of this course for other programs of studies	All fields of process engineering and engineering management
Entry requirements and recommended requirements	Advanced knowledge of natural sciences, process engineering and energy technology
Literature	Please see course description
Teaching and learning methods	Seminaristic teaching / exercises
Specialities (additional information)	no

course name	EB7105 LEAN-Management (Value Stream Mapping) and FMEA	
Module	EB-30: Process Optimization	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Engineering	
Semester	7	
Weekly semester hours	2	
Credit Points	3	
Winter- / sommersemester	WS	
Work load in hours	90h; Attendance time: 22,5 h, Additional workload: 52,5 h exam preparation: 15 h	
Course Code	EB7105 LEAN-Management (Value Stream Mapping) and FMEA	
Teaching Language	English	
Responsible for module	Prof. Markus Hainthaler	
Type of course	X	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV - accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	N.N.	
Type of exam	Module: Written exam (90 min)	
Learning content of this course	<p>Lean Management:</p> <ul style="list-style-type: none"> • Definition of future state • Identifying the customer´s needs • Creating a mapping team • Mapping methods • Types of value streams • PDCA model <p>Fundamentals of FMEA:</p> <ul style="list-style-type: none"> • Reliability analysis • Risk assessment • Fault tree analysis 	
Literature	<ul style="list-style-type: none"> • Beau Keyte, Drew A. Locher "The complete Lean Enterprise", CRC Press, 2015 • C.M. Chang "Engineering Management", Pearson, 2005 • Bernd Bertsche, Reliability in Automotive and Mechanical Engineering, Springer, 2008 	
Teaching and learning methods	Seminaristic teaching / exercises	
Specialities (additional information)	no	

course name	EB7106 Process Optimization in Control and Systems Engineering	
Module	EB-30: Process Optimization	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Engineering	
Semester	7	
Weekly semester hours	2	
Credit Points	2	
Winter- / summersemester	WS	
Work load in hours	60h; Attendance time: 22,5 h additional workload: 27,5 h exam preparation 10 h	
Course Code	EB7106 Process Optimization in Control and Systems Engineering	
Teaching Language	English	
Type of course	X	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV - accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	Prof. Markus Hainthaler	
Type of exam	Written exam (90 min)	
Responsible for module	Prof. Markus Hainthaler	
Learning content of this course	Process Integration: <ul style="list-style-type: none"> • Efficiency and sustainability • Identification of integration potentials • HEN targeting • PINCH method Process Optimization: <ul style="list-style-type: none"> • Creation of simulation models • Local and global optimality • Optimization problems 	
Literature	J. Klemes, F. Friedler "Sustainability in the process industry", McGraw Hill, 2011	
Teaching and learning methods	Seminaristic teaching / exercises	
Specialities (additional information)	no	

EB-31 Capital Budgeting and Financing

module name	EB-31 Capital Budgeting and Financing
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS16
modul history	
Creditpoints (ECTS)	10
Module number	EB-31
Module components (courses)	EB3115 Financing EB3116 Capital Budgeting and Controlling
Responsible for module	N.N.
major field of study	Management
Duration of module exam in min.	120 min.
Type of exam	GMPschr.
Module description	
Modul level	Bachelor
Grade weighting	10/210
Learning outcomes of this module	
Expertise	
<ul style="list-style-type: none"> • Cost Accounting, • Bookkeeping (Balance Sheet and Profit and Loss Account), • Static and dynamic Capital Budgeting Methods, Cost Allocation Sheet, • Job Costing, • Balance Sheet and Profit and Loss ratios, Cash Flow 	
Fertigkeiten / Skills	
<ul style="list-style-type: none"> • Analyse of the customer´s needs, the status quo and the future state • Decide between several budgeting methods • Identify essential financial methods 	
Method competences:	
<ul style="list-style-type: none"> • Ability to recognize optimization budgeting • Ability to initiate optimization finances 	
Usability of this course for other programs of studies	All fields of budgeting and financing
Entry requirements and recommended requirements	Advanced knowledge of principles in business
Literature	Please see course description
Teaching and learning methods	Seminaristic teaching / exercises
Specialities (additional information)	no

course name	EB3115 Financing	
Module	EB-31 Capital Budgeting and Financing	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Management	
Semester	3	
Weekly semester hours	4	
Credit Points	5	
Winter- / summersemester	WS	
Work load in hours	150h; Attendance time: 45 h, additional workload: 80 h exam preparation: 25 h	
Course Code	EB3115 Financing	
Teaching Language	English	
Responsible for module	N.N.	
Type of course	X	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV - accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	N.N.	
Type of exam	Written exam (90 min)	
Learning content of this course		
<ul style="list-style-type: none"> • Simple interest calculations, compound interest calculations; calculation of interest rates and calculations of repayment and returns • Basic concepts, aims and instruments of finance. Liquidity, capital requirements, financial equilibrium, organisation of the appropriate finance, payments, instruments of financial management (financial key figures, financial plan, controls) • Knowledge of forms and sources of capital • Types of financing (esp. sales and investment financing), relevant financial markets, alternative forms of finance (Leasing, Factoring), credit discussion, preparation for credit rating , credit assurance • Overview of the possibilities and restrictions of finance management with regard to various time horizons • Basic principles of financial planning, balance analysis, finance analysis, rules of finance, significance of financial products within the context of risk management 		
Literature	<ul style="list-style-type: none"> • Olfert, Klaus, Kompakt-Training Finanzierung, Kiehl Verlag, Ludwigshafen, 2005 • Bisani, Hans Paul, Entwicklung der Kreditpreise unter Einfluss von Basel II, in: Übelhör/Warns (Hrsg.), Basel II, PD-Verlag, Heidenau, 2004 	
Teaching and learning methods	Seminaristic teaching / exercises	
Specialities (additional information)	no	

course name	EB3116 Capital Budgeting and Controlling	
Module	EB-31 Capital Budgeting and Financing	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Management	
Semester	3	
Weekly semester hours	4	
Credit Points	5	
Winter- / summersemester	WS	
Work load in hours	150h; Attendance time: 45 h, additional workload: 80 h exam preparation: 25 h	
Course Code	EB3116 Capital Budgeting and Controlling	
Teaching Language	English	
Type of course	X	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV - accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	Prof. Dr. Brauch-Widmann	
Type of exam	Written exam (120 min)	
Responsible for module	N.N.	
Learning content of this course		
<ul style="list-style-type: none"> • Cost Accounting, • Bookkeeping (Balance Sheet and Profit and Loss Account), • Static and dynamic Capital Budgeting Methods, • Cost Allocation Sheet, • Job Costing, • Balance Sheet and Profit and Loss ratios, • Cash Flow 		
Literature	Script	
Teaching and learning methods	Seminaristic teaching / exercises	
Specialities (additional information)	no	

EB-32 Management

module name	EB-32 Management
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS16
modul history	
Creditpoints (ECTS)	5
Module number	EB-32
Module components (courses)	EB5114 Project Management EB5115 Innovation Management
Responsible for module	Prof. Dr. Raimund Brotsack
major field of study	Management
Duration of module exam in min.	90 min.
Type of exam	GMPschr. 90 min.
Module description	
Modul level	Bachelor
Grade weighting	5/210
<p>Learning outcomes of this module</p> <p>Expertise: Application of the tools of analysis and management in business theory and Praxis. Training in entrepreneurial thinking and dealing. Teaching of basic principles of innovation management and Business Development.</p> <p>Skills: Understanding of the theoretical principles of Strategic Management. The student will understand the importance of continuous and structured active business development and being able to choose and apply adequate management tools in professional practice.</p> <p>Method competences: Students are able to structure a project independently and draw up a binding schedule with realistic milestones, as well as carry out a progress check. Through the teaching of the fundamental elements of innovation management, the student should be in a position to analyse the innovation process in a company, recognize the opportunities and risks of innovations and be able to actively organise the innovation-management of a company.</p>	
Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	keine
Literature	Siehe Kursbeschreibung
Teaching and learning methods	seminaristic teaching / exercises / tutorials / project work in groups
Specialities (additional information)	Keine

course name	EB5114 Project Management	
Module	EB-32: Management	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Allgemein	
Semester	5	
Weekly semester hours	2	
Credit Points	2	
Winter- / Summersemester	WS	
Work load in hours	60 h Attendance time: 22,5 h Additional workload: 27,5 h Exam preparation: 10 h	
Course Code	EB5114 Project Management	
Teaching Language	English	
Type of course	x	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject – both majors
		PLV - accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	Prof. Dr. Raimund Brotsack	
Type of exam	GMPschr 90 min.	
Responsible for module	Prof. Dr. Raimund Brotsack	
Learning content of this course		
<ul style="list-style-type: none"> • Application of the tools of analysis and management in business theory and Praxis. Training in entrepreneurial thinking and dealing. • Structuring of projects with time and milestone planning • Set out realistic project targets with use of resources and cost-benefit analysis. • Control of project development. • Monitoring of target achievement. • Fall-back solutions for emergencies 		
Literature	<ul style="list-style-type: none"> • Terry D. Schmidt; "Strategic Project Management Made Simple: Practical Tools for Leaders and Teams"; John Wiley and Sons Ltd; (10. march 2009); ISBN-10: 0470411589; ISBN-13: 978-0470411582 • Heinrich Kessler, Georg Winkelhofer, Projektmanagement – Leitfaden zur Steuerung und Führung von Projekten, Springer Verlag, Berlin Heidelberg - New York 	
Teaching and learning methods	seminaristic teaching / exercises / project work in groups	
Specialities (additional information)	keine	

course name	EB5115 Innovation Management	
Module	EB-32: Management	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Allgemein	
Semester	5	
Weekly semester hours	2	
Credit Points	3	
Winter- / summersemester	WS	
Work load in hours	90 h Attendance time: 22,5 h Additional workload: 52,5 h Exam preparation 15 h	
Course Code	EB5115 Innovation Management	
Teaching Language	English	
Type of course	x	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject – both majors
		PLV - accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	Prof. Dr. Raimund Brotsack	
Type of exam	GMPschr 90 min.	
Responsible for module	Prof. Dr. Raimund Brotsack	
Learning content of this course	<ul style="list-style-type: none"> • Teaching of basic principles of innovation management • Strategic innovation planning • Customer benefits through innovation • creative processes and systematic brainstorming • Evaluation and selection of ideas • feasibility check • Development planning • Intellectual property 	
Literature	<ul style="list-style-type: none"> • Strebel, Heinz, Gelbmann, Ulrike; „Innovations und Technologiemanagement“, Facultas-Verlag, Wien, 2007 • Keith Goffin, Rick Mitchell; „Innovation Management: Effective strategy and implementation“ Palgrave; 3rd ed. 2017; ISBN-10: 1137373431; ISBN-13: 978-1137373434 • Melissa A. Schilling; „Strategic Management of Technological Innovation; Mcgraw-Hill Education - Europe; 4 International ed. (1. Februar 2013); ISBN-10: 0071326448; ISBN-13: 978-0071326445 	
Teaching and learning methods	seminaristic teaching / home work / project work in groups	
Specialities (additional information)	keine	

EB-33 Maintenance, Repair and Operation Strategies and Planning

module name	EB-33 Maintenance, Repair and Operation Strategies and Planning
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS16
modul history	
Creditpoints (ECTS)	5
Module number	EB-33
Module components (courses)	EB4113 Maintenance, Repair and Operation Strategies EB4114 Strategic Planning
Responsible for module	Zeljko Loncaric Dipl.-Ing. (FH), MBA
major field of study	Management
Duration of module exam in min.	90 min
Type of exam	GMPSchr
Module description	
<p>This course projects how Maintenance, Repair and Operation (MRO) strategies can be optimized to the specific needs of endusers. The student can significantly reduce the design and production times for customized parts. This leads to key advantages for MRO strategies from the enduser perspective, as well as environmental and cost benefits. By enabling endusers to quickly adapt and manufacture spare parts themselves, the dependence on service providers, and parts and product manufacturers is disrupted. Therefore, endusers can better capitalize on their operational knowledge and experience.</p>	
Modul level	Bachelor
Grade weighting	5/210
Learning outcomes of this module	
Expertise:	
<p>The students should learn an efficient and goaloriented maintenance management. Efficient and goaloriented maintenance management makes it necessary to implement structured business processes and use up-to-date, demand-oriented data bases (stock data and status data). Failure to carry out maintenance work will initially have little impact on safety - an increase in the number of failures occurs with a time delay. But like all systems used over long periods of time, however, a track maintenance facility does not forgive maintenance failures: the service life of the system is shortened rapidly - the life cycle costs increase disproportionately.</p> <p>The students learn a systematic process of envisioning a desired future, and translating this vision into broadly defined goals or objectives and a sequence of steps to achieve them. In contrast to long-term planning, strategic planning begins with the desired-end and works backward to the current status. In addition, in contrast to tactical planning, strategic planning looks at the wider picture and is flexible in choice of its means.</p>	
Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	no
Literature	See courses
Teaching and learning methods:	seminaristic teaching / exercises / home work
Specialities (additional information)	no

course name	EB-4113 Maintenance, Repair and Operation Strategies	
Module	EB-33	
examination regulations	NuW-IE-B-WS16	
Course		
major field of study	Management	
Semester	4	
Weekly semester hours	2	
Credit Points	3	
Winter- / summersemester	Wintersemester	
Work load in hours	90 h Attendance time: 22,5 h Additional workload 52,5 h exam preparation: 15 h	
Course Code	EB4117	
Teaching Language	English	
Type of course	x	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV - accompanying course for internship
		SWP compulsory elective subject
		elective
Course lecturer	Zeljko Loncaric Dipl.-Ing. (FH), MBA	
Type of exam	GMPschr 90 min.	
Responsible for module	Zeljko Loncaric Dipl.-Ing. (FH), MBA	

Learning content of this course

The students should learn an efficient and goaloriented maintenance management. Efficient and goal-oriented maintenance management makes it necessary to implement structured business processes and use up-to-date, demand-oriented data bases (stock data and status data). Failure to carry out maintenance work will initially have little impact on safety - an increase in the number of failures occurs with a time delay. But like all systems used over long periods of time, however, a track maintenance facility does not forgive maintenance failures: the service life of the system is shortened rapidly - the life cycle costs increase disproportionately.

The student gets an overview of the most important aspects of the maintenance of production plants:

- Capacity
- Substance
- Quality

Literature

- *Script*
- Burduk, A., Mazurkiewicz, D., 2017. *Intelligent Systems in Production Engineering and Maintenance – ISPEM 2017: Proceedings of the First International Conference on Intelligent Systems in Production Engineering and Maintenance ISPEM 2017*. Springer.
- Kelly, A., 2006. *Strategic Maintenance Planning*. Elsevier.
- Mobley, R.K., 2002. *An Introduction to Predictive Maintenance*. Elsevier.
- Pearce, S.L., MacInnes, R.L., 2003. *Strategic MRO: A Roadmap for Transforming Assets into Competitive Advantage*. CRC Press.
- Sanz-Bobi, M.A., 2014. *Use, Operation and Maintenance of Renewable Energy Systems: Experiences and Future Approaches*. Springer.
- Ustundag, A., Cevikcan, E., 2017. *Industry 4.0: Managing The Digital Transformation*. Springer.

Teaching and learning methods	seminaristic teaching / exercises / home work
Specialities (additional information)	no

course name	EB-4114 Strategic Planning	
Module	EB-33	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Management	
Semester	4	
Weekly semester hours	2	
Credit Points	2	
Winter- / summersemester	Wintersemester	
Work load in hours	60 h Attendance time: 22,5 h additional workload: 27,5 h exam preparation: 10 h	
Course Code	EB4118	
Teaching Language	English	
Type of course	x	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV - accompanying course for internship
		SWP - compulsory elective subject
		Elective
Course lecturer	Zeljko Loncaric Dipl.-Ing. (FH), MBA	
Type of exam	GMPschr 90 min.	
Responsible for module	Zeljko Loncaric Dipl.-Ing. (FH), MBA	
Learning content of this course		
<p>The students learn a systematic process of envisioning a desired future, and translating this vision into broadly defined goals or objectives and a sequence of steps to achieve them. In contrast to long-term planning, strategic planning begins with the desired-end and works backward to the current status. In addition, in contrast to tactical planning, strategic planning looks at the wider picture and is flexible in choice of its means.</p> <p>After completing the course, the students can work with the strategic management framework:</p> <ul style="list-style-type: none"> • Formulation: <ul style="list-style-type: none"> ➤ Analysis ➤ Strategy Formation ➤ Goal Setting • Implementation <ul style="list-style-type: none"> ➤ Structure ➤ Control and Feedback 		
Literature		
<ul style="list-style-type: none"> • Collins, J., 2011. <i>Good to Great: Why Some Companies Make the Leap and Others Don't</i>, 1 edition. ed. HarperBusiness. • Collins, J., Hansen, M.T., 2011. <i>Great by Choice: Uncertainty, Chaos and Luck - Why Some Thrive Despite Them All</i>. Random House. • Dyer, J., Gregersen, H.B., Christensen, C.M., 2011. <i>The Innovator's DNA: Mastering the Five Skills of Disruptive Innovators</i>. Harvard Business Press. • Osterwalder, A., Pigneur, Y., 2009. <i>Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers</i>. OSF. 		
Teaching and learning methods	seminaristic teaching / exercises / home work	
Specialities (additional information)	no	

EB-34 Globalisation

module name	EB-34 Globalisation
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS16
modul history	
Creditpoints (ECTS)	5
Module number	EB-34
Module components (courses)	EB7107 Regional and Global Economic Regions EB7108 International Integration
Responsible for module	Prof. Dr. Stefan Mátéfi-Tempfli
major field of study	Major Management
Duration of module exam in min.	90 min
Type of exam	GMPSchr 90 min.
Module description	The module addresses the frameworks and consequences of social, political and economic processes of development, in addition to change and globalization in selected regions. Students are able to study from different angles the different aspects of regional and global economics as well as of international integration and globalization.
Modul level	Bachelor
Grade weighting	5/210
Learning outcomes of this module	
Expertise:	<ul style="list-style-type: none"> • Introduction to economic geography • Latest theories and methodologies • spatial disparities, from spatial concentration measurement to structural estimations of economic geography models • How economic integration is transforming the global economy into an economic space • Problems and challenges of regional integration processes • The role of regional integration for economic development and global governance • Political and sociological aspects of geographical relocations
Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	keine
Literature	-
Teaching and learning methods	seminaristic teaching / exercises / home work
Specialities (additional information)	-

course name	EB7107 Regional and Global Economic Regions	
Module	EB-34 Globalisation	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Major Management	
Semester	7	
Weekly semester hours	2	
Credit Points	5/2	
Winter- / summersemester	Wintersemester	
Work load in hours	75 h Attendace time: 30 h, Homework 25 h, exam preparation 20 h	
Course Code	EB7107	
Teaching Language	English	
Type of course	x	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV - accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	N.N.	
Art der Prüfung Type of exam	GMPschr 90 min.	
Responsible for module	Prof. Dr. Stefan Mátéfi-Tempfli	
Learning content of this course		
<ul style="list-style-type: none"> • Spatial Inequalities • Space in Economic Thought • Monopolistic Competition • Interregional Trade and Market Size • Gravity and Trade Costs • The Core-Periphery Structure • Intermediate Goods and the Evolution of Regional Disparities • Spatial Development, Competition, Concentration and Local Productivity • The Empirics of Economic Geography 		
Literature		
<ul style="list-style-type: none"> • Pierre-Philippe Combes, Thierry Mayer, Jacques-François Thisse, Economic Geography: The Integration of Regions and Nations, Princeton University Press 2008 • Henryk Kierzkowski, Europe and Globalization, Palgrave McMil- Ian 2002 		
Teaching and learning methods	seminaristic teaching / exercises / home work	
Specialities (additional information)	-	

course name	EB7108 International Integration	
Module	EB-34 Globalisation	
Examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Major Management	
Semester	7	
Weekly semester hours	2	
Credit Points	5/2	
Winter- / summersemester	Wintersemester	
Work load in hours	75 h Attendance time: 30 h, homework 25 h, exam preparation 20 h	
Course Code	EB7108	
Teaching Language	English	
Type of course	x	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV - accompanying course for internship
		SWP - compulsory elective subject
		Elective
Course lecturer	N.N.	
Type of exam	GMPschr 90 min.	
Responsible for module	Prof. Dr. Stefan Mátéfi-Tempfli	
Learning content of this course:	<ul style="list-style-type: none"> • Integration experiences in different regions • Regional integration and the multilateral trading system • Regional trade and foreign direct investment • Regional financial integration • Monetary integration 	
Literature	<ul style="list-style-type: none"> • Ulrich Volz, Regional Integration, Economic Development and Global Governance, Edward Elgar 2011 • Lecture notes 	
Teaching and learning methods	seminaristic teaching / exercises / home work	
Specialities (additional information)	-	

Industrial Engineering / Maintenance and Operation

module name	EB-35 Business Planning and Start-up Management
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS16
modul history	
Creditpoints (ECTS)	5
Module number	EB-35
Module components (courses)	EB5114 Project Management EB5115 Innovation Management
Responsible for module	Prof. Dr. Raimund Brotsack
major field of study	General
Duration of module exam in min.	90 min.
Type of exam	GMPschr.
Module description	
Modul level	Bachelor
Grade weighting	5/210
Learning outcomes of this module	
Expertise	
Application of the tools of analysis and management in business theory and Praxis. Training in entrepreneurial thinking and dealing. Teaching of basic principles of innovation management and Business Development.	
Skills	
Understanding of the theoretical principles of Strategic Management. The student will understand the importance of continuous and structured active business development and being able to choose and apply adequate management tools in professional practice.	
Method competences:	
Students are able to structure a project independently and draw up a binding schedule with realistic milestones, as well as carry out a progress check. Through the teaching of the fundamental elements of innovation management, the student should be in a position to analyse the innovation process in a company, recognize the opportunities and risks of innovations and be able to actively organise the innovation-management of a company.	
Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	keine
Literature	Siehe Kursbeschreibung
Teaching and learning methods	seminaristic teaching / exercises / tutorials / project work in groups
Specialities (additional information)	none

course name	EB5114 Project Management	
Module	EB-32: Management	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Management	
Semester	5	
Weekly semester hours	2	
Credit Points	2	
Winter- / Summersemester	WS	
Work load in hours	60 h Attendance time: 22,5 h Additional workload: 27,5 h Exam preparation: 10 h	
Course Code	EB5114 Project Management	
Teaching Language	English	
Type of course	x	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject – both majors
		PLV - accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	N.N.	
Type of exam	GMPschr 90 min.	
Responsible for module	Prof. Dr. Raimund Brotsack	
Learning content of this course:	<ul style="list-style-type: none"> • Application of the tools of analysis and management in business theory and Praxis. Training in entrepreneurial thinking and dealing. • Structuring of projects with time and milestone planning • Set out realistic project targets with use of resources and costbenefit analysis. • Control of project development. • Monitoring of target achievement. • Fall-back solutions for emergencies 	
Literature	<ul style="list-style-type: none"> • Terry D. Schmidt; "Strategic Project Management Made Simple: Practical Tools for Leaders and Teams"; John Wiley and Sons Ltd; (10. march 2009); ISBN-10: 0470411589; ISBN- 13: 978-0470411582 • Heinrich Kessler, Georg Winkelhofer, Projektmanagement – Leitfaden zur Steuerung und Führung von Projekten, Springer Verlag, Berlin – Heidelberg - New York 	
Teaching and learning methods	seminaristic teaching / exercises / project work in groups	
Specialities (additional information)	keine	

course name	EB5115 Innovation Management	
Module	EB-32: Management	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Management	
Semester	5	
Weekly semester hours	2	
Credit Points	3	
Winter- / summersemester	WS	
Work load in hours	90 h Attendance time: 22,5 h Additional workload: 52,5 h Exam preparation: 15 h	
Course Code	EB5115 Innovation Management	
Teaching Language	English	
Type of course	x	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject – both majors
		PLV - accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	Prof. Dr. Raimund Brotsack	
Type of exam	GMPschr 90 min.	
Responsible for module	Prof. Dr. Raimund Brotsack	
Learning content of this course	<ul style="list-style-type: none"> • Teaching of basic principles of innovation management • Strategic innovation planning • Customer benefits through innovation • creative processes and systematic brainstorming • Evaluation and selection of ideas • feasibility check • Development planning • Intellectual property 	
Literature	<ul style="list-style-type: none"> • Strebel, Heinz, Gelbmann, Ulrike; „Innovations- und Technologiemanagement“, Facultas-Verlag, Wien, 2007 • Keith Goffin, Rick Mitchell; „Innovation Management: Effective strategy and implementation“ Palgrave; 3rd ed. 2017; ISBN-10: 1137373431; ISBN-13: 978-1137373434 • Melissa A. Schilling; „Strategic Management of Technological Innovation; Mcgraw-Hill Education - Europe; 4 International ed. (1. Februar 2013); ISBN-10: 0071326448; ISBN-13: 978- 0071326445 	
Teaching and learning methods	seminaristic teaching / home work / project work in groups	
Specialities (additional information)	keine	

EB-36 Logistics

module name	EB 36 Logistics
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS16
modul history	
Creditpoints (ECTS)	5
Module number	EB-36
Module components (courses)	EB4115 Logistics EB4116 Operations Research, especially Work-force Planning
Responsible for module	Ibrahim Bader
major field of study	Mandatory for Major Engineering
Duration of module exam in min.	90 min
Type of exam	GMPschr.
Module description	
Modul level	
Grade weighting	5/210
Learning outcomes of this module	<p>Students learn about logistics as a production support processes. They will also learn the major tasks and content of logistics. Students are able to apply the knowledge gained on process optimisation and the value chain.</p> <p>Further, key topic areas of Operations Research will be introduced together with the basic mathematical optimisation processes for dealing with these problems.</p>
Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	
Literature	See course description
Teaching and learning methods	Course teaching / exercises /tutorials / home work
Specialities (additional information)	No

course name	EB 4115 Logistics	
Module	EB 36 Logistics	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Mandatory for Major Engineering	
Semester	4	
Weekly semester hours	2	
Credit Points	3	
Winter- / summersemester	SS	
Work load in hours	90 h Time of attendance: 22,5 h Additional workload: 52,5 h Exam preparation: 15 h	
Course Code	EB4115	
Teaching Language	English	
Type of course	X	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV - accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	Prof. Dr. Rui Li	
Type of exam	GMPSchr 90 min	
Responsible for module	Ibrahim Bader	
Learning content of this course		
<ul style="list-style-type: none"> • The internationalisation of business systems and the concentration on key competences demand a strong network of collaboration between producers, distributors and the markets. The joining link in this network is the logistics chain (Supply Chain Management). Students gain an insight into the content, concepts, connections and development perspectives of logistics, with topic areas: work planning and production logistics, procurement logistics, distribution logistics, disposal logistics. • In addition current methods of process optimisation in the logistics chain will be discussed. • Students are able to apply the knowledge gained on process optimisation and the value chain. 		
Literature	Paul R. Murphy Jr., Donald Wood, Contemporary Logistics (11th Edition), Publisher: Pearson	
Teaching and learning methods	seminaristic teaching / exercises / tutorials / home work	
Specialities (additional information)	no	

course name	EB 4116 Operations Research, especially Workforce Planning	
Module	EB 36 Logistics	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Mandatory for Major Engineering	
Semester	4	
Weekly semester hours	2	
Credit Points	2	
Winter- / summersemester	SS	
Work load in hours	60 h Time of attendance: 22,5 h Additional workload: 27,5 h Exam preparation: 10 h	
Course Code	EB4116	
Teaching Language	English	
Type of course	X	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV - accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	N.N.	
Type of exam	GMPSchr 90 min	
Responsible for module	Ibrahim Bader	
Learning content of this course		
<ul style="list-style-type: none"> • Introduction/Overview • Linear optimization • Special linear optimization problems • Quadratic optimization • Non-linear optimization • Observations on further topics and processes of optimization 		
Literature		
<ul style="list-style-type: none"> • Script • Koop, H. Mook, Lineare Optimierung, Springer Verlag, 2008 • G. Heinrich, Operations Research, Oldenbourg Verlag, 2007 • W. Domschke, A. Drexl, Einführung in Operations Research, Springer Verlag, 7. Auflage, 2007 • W. Domschke et al., Übungen und Fallbeispiele zum Operations Research, Springer Verlag, 6. Auflage, 2007 • P. Stingl, Operations Research, Fachbuchverlag, 2002 		
Teaching and learning methods	Course teaching / exercises /tutorials / home work	
Specialities (additional information)	no	

module name	EB-37 Operational Process
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS16
modul history	
Creditpoints (ECTS)	5
Module number	EB-37
Module components (courses)	EB4117 Operational Organisation EB4118 Enterprise Information Systems
Responsible for module	Prof. Dr. Stefan Mátéfi-Tempfli
major field of study	Management
Duration of module exam in min.	90 min
Type of exam	GMPSchr
Module description	
<p>The module provides content of enterprise or- ganisation, the organisational units and functions, as well as the challenges of the enterprise information systems and give insights into current development in business practice.</p> <p>The content of the course is reinforced with case studies worked out with the students.</p>	
Modul level	Bachelor
Grade weighting	5/210
Learning outcomes of this module	
Expertise:	
<ul style="list-style-type: none"> • Network and collaboration between organisations • Units or functions of purchasing and sales • Production control and process design • Supply chain management • Design, implementation, management, and control of information and communication technology [ICT] • Students are able to distinguish between different types of information and communication systems <p>In-depth knowledge about requirements for the effective and efficient use of ICT as well as about the importance of information systems for company's success</p>	
Personal and Social skills:	
<ul style="list-style-type: none"> • Applying of theoretical concepts to practical applications. • Develop analytical thinking, attention to details and ability to consider different strategies to solve problems. • Students are able to solve business problems in the field of information systems by applying systematic approaches and by identify alternative solutions in teams 	
Method competences:	
<ul style="list-style-type: none"> • Principles of organisational arrangements • Apply theory to business cases (case study) • Operational information processing • Applications of information systems in business practice 	
Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	keine
Literature	-
Teaching and learning methods	seminaristic teaching / exercises / home work
Specialities (additional information)	-

course name	EB 4117 Operational Organisation	
Module	EB-37: Operational Processes	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Management	
Semester	4	
Weekly semester hours	2	
Credit Points	2	
Winter- / sommersemester	Summer semester	
Work load in hours	60 h Attendance time: 22,5 h, Additional workload: 27,5 h exam preparation: 10 h	
Course Code	EB4117	
Teaching Language	English	
Type of course	x	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV - accompanying course for internship
		SWP - compulsory elective subject
		elective
Course lecturer	Prof. Dr. Rui Li	
Type of exam	GMPschr 90 min.	
Responsible for module	Prof. Dr. Stefan Mátéfi-Tempfli	
Learning content of this course		
<p>The understanding of company organisation contributes a great deal to maintaining full control a company. The organisational units or functions of purchasing and sales will be discussed, with their essential processes and the necessary tools and demands on the staff. The purchasing department is seen in this process as a negotiating partner of the sales team. Methods and situations are subjects of discussion and the making of offers and completing of orders are important elements of the course content.</p> <ul style="list-style-type: none"> • The essential functions in the areas of purchasing and sales with their special demands on the staff and the resulting developing tasks such as customer orientation, the implementation of the concept of service with a view to maintaining customer loyalty or a win/win situation in the supply chain management will be discussed. • The incorporation of the purchasing and sales function into the organisation of the entire company, the information which thus becomes necessary, and the processing of it, will also be discussed. To conclude and reinforce the content of the course case studies will be worked on by the students. 		
Literature		
<ul style="list-style-type: none"> • Daft, R.L and Armstrong. A. (2014). Organisation Theory and Design. • Laux, H., Liermann, F.: Grundlagen der Organisation. Springer, 6. Aufl. Berlin 2005 • Eversheim, W., Organisation in der Produktionstechnik, Arbeitsvorbereitung, VDI Verlag, Düsseldorf Näher U., Handbuch Globale Produktion, Hanser Verlag München Wien 		
Teaching and learning methods	seminaristic teaching / exercises / home work	
Specialities (additional information)	-	

Course name	EB 4118 Enterprise Information Systems	
Module	EB-37: Operational Processes	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Management	
Semester	4	
Weekly semester hours	2	
Credit Points	3	
Winter- / sommersemester	Summer semester	
Work load in hours	90 h Attendance time: 22,5 h, additional workload: 52,5 h exam preparation: 15 h	
Course Code	EB4118	
Teaching Language	English	
Type of course	x	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV - accompanying course for internship
		SWP - compulsory elective subject
		Elective
Course lecturer	N.N.	
Type of exam	GMPschr 90 min.	
Responsible for module	Prof. Dr. Stefan Mátéfi-Tempfli	
Learning content of this course		
<ul style="list-style-type: none"> • The importance of information systems • IT infrastructures and web technologies • Databases and information management • Operational information processing (ERP, SCM, CRM, etc.) • E-procurement and e-commerce • Business process management • IT-enabled knowledge management and decision making • E-Society and political/legal aspects of information systems • Applications and case studies: information systems in business practice 		
Literature	<ul style="list-style-type: none"> • Management Information Systems: Managing the Digital Firm, 13th Edition, Laudon K. C., Laudon J.P., Pearson 2014. 	
Teaching and learning methods	seminaristic teaching / exercises / home work	
Specialities (additional information)	-	

EB-38 Cost Accounting and Budgeting

module name	EB-38 Cost Accounting and Budgeting
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS16
modul history	
Creditpoints (ECTS)	5
Module number	EB-37
Module components (courses)	EB3117 Cost Accounting EB3118 Budgeting
Responsible for module	N.N.
major field of study	Management
Duration of module exam in min.	90 min
Type of exam	GMPSchr
Module description	
<p>The module provides content of recording, classifying, analyzing, summarizing, allocating, and evaluating various alternative courses of action for the control of costs. Budgeting is entirely optional, but it's an important component of financial success. It's not difficult to implement, and it's not just for people with limited funds. Budgeting makes it easier for people with incomes and expenses of all sizes to make conscious decisions about how they'd prefer to allocate their money.</p> <p>The content of the course is reinforced with case studies worked out with the students.</p>	
Modul level	Bachelor
Grade weighting	5/210
Learning outcomes of this module	
Expertise:	
<p>Basic knowledge of accounting, balancing of accounts, and German tax laws. The students should be able to analyse and justify the financial situation of the company as represented in the balance sheets. Application-oriented knowledge of external accounting and knowledge of basic legal principles of commercial and tax laws thus form the basis of behaviour in accordance with the law.</p> <p>In the "Accounting" section, among other things, the basic rules of the German Commercial Code regarding accounting and the calculation of profit and loss will be examined more closely in association with the accounting law. Besides the peculiarities of the individual legal forms, the areas of disclosure and basic principles of the end of year analysis will be dealt with.</p> <p>In addition to the basic principles of costing, the processes in general use today of static and dynamic capital expenditure budgeting will be discussed and taught with the use of examples. The decisions, such as investment, Make or Buy will be demonstrated, deriving from the application of these processes.</p>	
Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	no
Literature	-
Teaching and learning methods	seminaristic teaching / exercises / home work
Specialities (additional information)	no

course name	EB 3117 Cost Accounting	
Module	EB-38: Cost Accounting and Budgeting	
examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Management	
Semester	3	
Weekly semester hours	2	
Credit Points	3	
Winter- / summersemester	Wintersemester	
Work load in hours	90 h Attendance time: 22,5 h Additional workload 52,5 h exam preparation: 15 h	
Course Code	EB4117	
Teaching Language	English	
Type of course	<input checked="" type="checkbox"/>	FWP - voluntary elective subject
	<input type="checkbox"/>	Core / optional compulsory subject
	<input type="checkbox"/>	compulsory subject
	<input type="checkbox"/>	PLV - accompanying course for internship
	<input type="checkbox"/>	SWP - compulsory elective subject
	<input type="checkbox"/>	elective
Course lecturer	N.N.	
Type of exam	GMPschr 90 min.	
Responsible for module	N.N.	
Learning content of this course		
<ul style="list-style-type: none"> • Duties and allocation of business accounting • Legal obligation to keep accounts according to commercial and tax law. • Principles of proper accounting • Accounts, transactions • Principles of the balance sheet • Principle that tax accounting should be based on commercial accounting • Calculation of profit and loss • Balance sheet analysis • Auditing duty, disclosure, and company accounting 		
Literature	<ul style="list-style-type: none"> • Legal texts Däumler, K.-D./Grabe J.: Kostenrechnung 1, Grundlagen, 9.Auflage 2003 • Joos-Sachse Th., Controlling, Kostenrechnung und Kostenmanagement, 3.Auflage 2004 Meyer • Bilanzierung nach Handels- und Steuerrecht, 17.Aufl. 2006 Thiel / Lüdtke-Handjery, Bilanzrecht, 5.Auflage 2005 	
Teaching and learning methods	seminaristic teaching / exercises / home work	
Specialities (additional information)	no	

course name	EB 3118 Budgeting	
Module	EB-38: Budgeting	
Examination regulations	NuW-IE-B-WS16	
Course history		
major field of study	Management	
Semester	3	
Weekly semester hours	2	
Credit Points	2	
Winter- / summersemester	Wintersemester	
Work load in hours	60 h Attendance time: 22,5 h additional workload: 27,5 h exam preparation: 10 h	
Course Code	EB4118	
Teaching Language	English	
Type of course	x	FWP - voluntary elective subject
		Core / optional compulsory subject
		compulsory subject
		PLV - accompanying course for internship
		SWP - compulsory elective subject
		Elective
Course lecturer	N.N.	
Type of exam	GMPschr 90 min.	
Responsible for module	N.N.	
Learning content of this course		
<p>Modern business enterprises must be able to reach each business decisions fast, efficiently and comprehensibly, in order to withstand competition.</p> <ul style="list-style-type: none"> • Familiarity with the methods of capital expenditure budgeting as an aspect of business accounting and part of the information and controlling system is an essential precondition for successful cooperation as an industrial engineer. • In addition to the basic principles of costing, the processes in general use today of static and dynamic capital expenditure budgeting will be discussed and taught with the use of examples. • The decisions, such as investment, Make or Buy will be demonstrated, deriving from the application of these processes. • Amongst other things, key figure systems, product and customer analyses and the collaboration of the controlling department are an essential part of business planning. • Case studies will be discussed and worked on by students as extension and reinforcement exercises 		
Literature	Script	
Teaching and learning methods	seminaristic teaching / exercises / home work	
Specialities (additional information)	no	

EB-39 Insights into the corporate world

Module name	EB-39 Insights into the corporate world
Module components	EB1109 Insights into the corporate world I EB2110 Insights into the corporate world II
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
Examination regulations	NuW-IE-B-WS16
Module history	
Module number	EB-39
Responsible for module	Prof. Dr. rer. nat. Raimund Brotsack
Lecturer	Christian Wachtmeister
Semester	1 and 2
Duration of module exam in min.	90 min
Type of exam	GMPschr
Type of module	Voluntary
Weekly semester hours	2
Creditpoints (ECTS)	5
Work load	150 h Attendance time: 45 h additional workload: 80 h Preparation for Exam: 25 h
Teaching Language	English
Learning outcomes of this module:	
<p>After completing the module Insights into the corporate world I + II the students achieved the following learning outcomes of this module:</p> <p>Students will have an understanding about how local German and multinational, international companies are functioning. Starting from the establishing of a company, defining a Business Plan and Strategy. Followed by possibilities how to break down the strategy into objectives, targets and goals for departments and individuals.</p> <p>Additionally students will know about the different ways how to organize a company or a department and choose the most suitable kind of organization for a certain situation or business case.</p> <p>Beside the theoretical knowledge the students will be also equipped with necessary awareness of cultural difference and how to deal with this in the daily working life.</p>	

In the module **Insights into the corporate world I + II** the following competences should be achieved:

Expertise: Organization Theory

Method competences: Defining strategy, Formulating objectives and goals

Social skills: Intercultural Competence

Educational objectives of this module:

- Strategy and Culture
- Corporate Culture, Vision, Mission
- Business Plan, Business Model Canvas
- Corporate Values, Corporate Governance

Implementation of Strategy

- Principles of ISO 9001
- Management by Objectives
- Key Performance Indices
- Review of Strategy and Objectives

Organization Theory and Reality

- Line, Staff, Project and Matrix Organization
- Agile Organization
- Examples from the Corporate World
- The process of a product through an Organization
- Lifecycle Management

Entry requirements and recommended requirements

Usability of this module for this program of studies

This Module gives a detailed overview how strategic and operational process in German and international companies are executed. Therefore this Module links other theoretical modules to the requirements of the corporate world.

Usability of this module for other programs of studies

For other programs of studies this module gives an overview about the processes in companies.

Teaching and learning methods

Lecture, Exercises, Excursions

Specialities (additional)

Literature

- Drucker, Peter F., Innovations and Entrepreneurship, Harper, New York, 1993
- Collins, Jim, Built to Last, Harper, New York, 2002
- Collins, Jim, Good to Great, Harper, New York, 2001
- Nowotny, Valentin, Agile Unternehmen, BusinessVillage, Göttingen, 2016
- Jung, Hans, Allgemeine Betriebswirtschaftslehre, Oldenburg Verlag, München, 2000
- Siebenbrock, Heinz, Grundlagen der Organisationsgestaltung und -entwicklung, niederle media, Altenberge, 2014
- Ismail, Salim, Exponential Organizations, Diversion Books, New York, 2014
- Schreyögg, Georg, Grundlagen der Organisation, Springer Gabler, Wiesbaden, 2012
- Hofstede, Geert, Lokales Denken, globales Handeln, Deutscher Taschenbuch Verlag, München, 2011
- Thomas, Alexander, Beruflich in China, Vandenhoeck & Ruprecht, Göttingen, 2015
- Thomas, Alexander, Beruflich in Malaysia, Vandenhoeck & Ruprecht, Göttingen, 2006
- Thomas, Alexander, Beruflich in USA, Vandenhoeck & Ruprecht, Göttingen, 2013
- Schulz von Thun, Friedemann, Interkulturelle Kommunikation: Methoden, Modelle, Beispiele, Rowohlt Taschenbuch Verlag, Reinbeck, 2016
- Simmel, Christian Ignaz, Interkulturelle Personalführung am Beispiel von international agierenden Unternehmen, Peter Lang, Frankfurt am Main, 2015

EB-42 Internship including PLV-seminars

module name	EB-42 Internship including PLV-seminars
Part of Curriculum	Industrial Engineering / Maintenance and Operation (Bachelor)
examination regulations	NuW-IE-B-WS16
modul history	
Creditpoints (ECTS)	30
Module number	EB-42
Module components (courses)	EB-42 Internship including PLV-seminars
Responsible for module	Prof. Dr. Sascha Kreiskott
major field of study	General
Duration of module exam in min.	-
Type of exam	<ul style="list-style-type: none"> • Report on activities during internship. (Written report 10 pages DIN A4 in digital form) • Certification from company in the form of a reference.
Module description	18 week full time internship in a field which is related to industrial engineering. The internship can be planned with any German company or a research institute. Student's who want to do the internship in an international context need to get approval by the Practical Responsible Professor.
Modul level	Bachelor
Grade weighting	30/210
Learning outcomes of this module	<p>Practical activity in an industrial firm or equivalent suitable training establishment for a period of 18 weeks. The students will become involved in actual projects within the company. Individual topics can result from the following areas:</p> <ul style="list-style-type: none"> •Business field and product planning •Business Development • Projecting of installations, project management and project controlling •Innovation and technology management •Technical planning and controlling •Technical purchasing, organisation and logistics •Marketing of industrial goods and Sales engineering •Controlling for specialised technical areas •Management assistance
Usability of this course for other programs of studies	Bachelor Industrial Engineering - Maintenance and Operation
Entry requirements and recommended requirements	For internship: 120 ECTS and PLV1 finalized. For PLV2: Internship finalized.
Literature	-
Teaching and learning methods	Internship
Specialities (additional information)	-

course name	EB 6101 Internship including PLV-seminars
Module	EB-42: Internship including PLV-seminars
examination regulations	NuW-IE-B-WS16
Course history	
major field of study	General
Semester	6
Weekly semester hours	Industrial internship lasting 18 weeks
Credit Points	30
Winter- / summersemester	SS
Work load in hours	Industrial internship lasting 18 weeks: 900 h Time at work: 40 h per week Additional time: 10 h per week
Course Code	EB6101
Teaching Language	English / German
Type of course	<input type="checkbox"/> FWP - voluntary elective subject
	<input type="checkbox"/> Core / optional compulsory subject
	<input checked="" type="checkbox"/> compulsory
	<input type="checkbox"/> PLV - accompanying course for internship
	<input type="checkbox"/> SWP - compulsory elective subject
<input type="checkbox"/> elective	
Course lecturer	N.N.
Type of exam	Successful participation represents pass
Responsible for module	Prof. Dr. Sascha Kreiskott
Learning content of this course	
<p>Practical activity in an industrial firm or equivalent suitable training establishment for a period of 18 weeks. The students will become involved in actual projects within the company. Individual topics can result from the following areas:</p> <ul style="list-style-type: none"> •Business field and product planning •Business Development •Projecting of installations, project management and project controlling •Innovation and technology management •Technical planning and controlling •Technical purchasing, organisation and logistics •Marketing of industrial goods •Sales engineering •Controlling for specialised technical areas 	
Literature	-
Teaching and learning methods	Internship
Specialities (additional information)	-