

# **Module Handbook for the Degree Programme Business and Engineering (B.Eng.)**

Version applies to all students who begin their studies on 1 October 2017 or later

Basis: Study and examination regulations in the version dated 22 June 2022

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## Preliminary Remarks

This module handbook contains descriptions of all modules and their courses that have to be completed by students of the Bachelor's programme Business and Engineering (IBE) at the Technical University of Applied Sciences Würzburg-Schweinfurt (former University of Applied Sciences Würzburg-Schweinfurt).

Details on the first and second part of studies contain the description of all those modules laid down in the Appendix of the Study and Examination Regulations. With Core Elective Modules from the areas of engineering and business (ENG1/2/3/4 and BUS1/2/3/4) students can choose one area for specialisation. Possible areas of specialisation and the associated modules are listed in [Appendix 1](#) (engineering specialisation area) and [Appendix 2](#) (business specialisation area). Possible experiments for the module Laboratory Tests (LABT) are listed in [Appendix 3](#). From a variety of courses for the module Core Competences 2 (COC2) students have to complete one. Possible courses are listed in [Appendix 4](#).

In general, module descriptions are written in the respective language of instruction/examination according to the Study and Examination Regulations.

Due to changing conditions (e.g. newly appointed professors), actual teaching staff and times/dates may vary from the details given in this module handbook. Only the Curriculum published for the respective semester is binding; it is decided upon every semester and published in the e-Learning course "[Studien- und Prüfungsangelegenheiten/study and examination matters](#)".

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## First Part of Studies, Programme Semester 1 to 3

### MATB - Mathematics - Basics

Module profile			
Module ID	MATB		
Module name	Mathematics - Basics		
Exam number	3811100		
Duration	1 semester		
Frequency	Winter semester		
Credit hours (SWS)	6		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	90	60
Teaching format	SU (=seminar-like lecture) (4 SWS), Ü (=exercise course) (2 SWS)		
Language of instruction	English		

Organisation		
Responsible	Prof. Dr. Fabeck	
Lecturer(s)	Dr. Bauchspieß; Prof. Dr. Bier; Prof. Dr. Bletz-Siebert; Prof. Dr. Diethelm; Prof. Dr. Fabeck; Dr. Latour; Prof. Dr. H.-J. Meier; Prof. Dr. H. Walter; Prof. Dr. Wimmer; Prof. Dr. Zirkelbach	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 1 <sup>st</sup> semester  Core module -	IBL 1 <sup>st</sup> semester  Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-	
Recommended prerequisites for the participation in the <b>module</b>	Mathematical knowledge on advanced school level: elementary logic, sets, functions (in particular, real-valued functions of a real variable).	

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO
Examination - length/format	90-120 minutes The concrete length of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a> .
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

### Learning outcomes, content and literature

Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Understand and use fundamental mathematical concepts and methods that are necessary for technically oriented modules in higher semesters.</li> <li>• Solve mathematical routine tasks in differential and integral calculus of one real variable.</li> <li>• Use methods from differential and integral calculus to solve practical problems.</li> <li>• Select appropriate models and methods for solving simple problems from the fields of industry and economy.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Sets and numbers</li> <li>• Complex numbers</li> <li>• Functions of real variables</li> <li>• Limits and continuity</li> <li>• Differential calculus of a single real variable</li> <li>• Integral calculus of a single real variable</li> <li>• Vectors</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Ayres, F. and Mendelson, E. (2013): <i>Schaum's Outline of Calculus</i>. New York: McGraw-Hill.</li> <li>• Stewart, J. (2015): <i>Calculus: Early Transcendentals - International Metric Ed.</i>, 8<sup>th</sup> ed., Andover: Cengage Learning EMEA.</li> <li>• Strang, G. (2017): <i>Calculus</i>, 3<sup>rd</sup> ed. Wellesley: Wellesley-Cambridge Press.</li> </ul>

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## PHYC - Physics

Module profile			
Module ID	PHYC		
Module name	Physics		
Exam number	3811200		
Duration	1 semester		
Frequency	Winter and summer semester (WS in IBE; SS in IBL)		
Credit hours (SWS)	6		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	90	60
Teaching format	SU (=seminar-like lecture) (4 SWS); Ü (= exercise course) (2 SWS)		
Language of instruction	English		

Organisation		
Responsible	Prof. Dr. Seufert	
Lecturer(s)	Dr. Davidson; Prof. Dr. Fabeck; Prof. Dr. Mark; Prof. Dr. Motzek; Prof. Dr. Seufert; Prof. Dr. H. Walter	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 1 <sup>st</sup> semester  Core module -	IBL 2 <sup>nd</sup> semester  Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-	
Recommended prerequisites for the participation in the <b>module</b>	-	

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO
Examination - length/format	90-120 minutes The concrete length of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a> .
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.



Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Understand the importance of physics for the engineering sciences.</li> <li>• Describe the fundamental principles of physics and recognize the physical laws behind technological applications.</li> <li>• Evaluate and calculate simple mechanical and fluid-mechanical systems.</li> </ul>
Content	<ol style="list-style-type: none"> <li><b>1. Mechanics</b> <ul style="list-style-type: none"> <li>• Basics of kinematics</li> <li>• Introduction to dynamics</li> <li>• Momentum and collisions</li> <li>• Rotational motion</li> </ul> </li> <li><b>2. Fluid mechanics</b> <ul style="list-style-type: none"> <li>• Basics of fluid statics and fluid dynamics</li> <li>• The Bernoulli equation and its applications</li> <li>• Laminar flow</li> <li>• Turbulent flow</li> <li>• The Bernoulli equation with friction</li> </ul> </li> <li><b>3. Oscillations</b> <ul style="list-style-type: none"> <li>• Simple harmonic motion</li> <li>• Undamped and damped harmonic oscillations</li> </ul> </li> </ol>
Literature	<ul style="list-style-type: none"> <li>• Halliday, D.; Resnick, R. and Walker, J. (2014): <i>Principles of Physics</i>, 10<sup>th</sup> ed., New York: John Wiley &amp; Sons.</li> <li>• Mosca, G. and Tipler, P.A. (2007): <i>Physics for Scientists and Engineers</i>, 6<sup>th</sup> ed., Basingstoke: Palgrave Macmillan.</li> </ul>

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## STAC - Statistics

Module profile			
Module ID	STAC		
Module name	Statistics		
Exam number	3930250		
Duration	1 semester		
Frequency	Winter and summer semester (WS in IBE; SS in IBL)		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	SU (= seminar-like lecture)		
Language of instruction	English		

Organisation		
Responsible	Prof. Dr. Kobmann	
Lecturer(s)	Dr. Davidson; Prof. Dr. Fabeck; Prof. Dr. Mark; Prof. Dr. Zirkelbach	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 1 <sup>st</sup> semester  Core module -	IBL 2 <sup>nd</sup> semester  Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-	
Recommended prerequisites for the participation in the <b>module</b>	-	

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO
Examination - length/format	90-120 minutes The concrete length of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">"Studien- und Prüfungsangelegenheiten/study and examination matters"</a> .
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Use basic terminology of statistics.</li> <li>• Define the role and interaction of descriptive statistics, probability calculus and inferential statistics.</li> <li>• Recognize and classify the implementation of these different parts of statistics into concrete statistical procedures.</li> <li>• Understand and classify the analysis of statistical data, the application of probability calculus to the analysis of random events, and the methodical collection of samples and their evaluation.</li> </ul>
Content	<ol style="list-style-type: none"> <li><b>1. Descriptive statistics</b> <ul style="list-style-type: none"> <li>• Fundamentals: Fundamental notions, sampling and processing data, process of a statistical study</li> <li>• Analysis of univariate data: frequency distributions, measures of central tendency and of dispersion, measures of concentration</li> <li>• Analysis of bivariate data: dependency of variables, contingency tables, analysis of correlation, regression analysis</li> <li>• Selected further topics ( e.g. time SPOies analysis, smoothing, index numbers, analysis of inventory )</li> </ul> </li> <li><b>2. Probability calculation</b> <ul style="list-style-type: none"> <li>• Fundamental concepts and important rules of probability calculation: events, probability space, axioms, combinatorics, theorem of Bayes</li> <li>• Random variables: probability functions and densities, expected value, variance, important calculation rules, important discrete and continuous distributions and their applications, e.g. in quality control, reliability and data transfer, Law of Large Numbers, central limit theorem</li> </ul> </li> <li><b>3. Inductive statistics</b> <ul style="list-style-type: none"> <li>• Estimation theory, especially estimation of mean values of normally distributed variables</li> <li>• Hypotheses testing, especially about mean values of normally distributed variables</li> </ul> </li> </ol>
Literature	<ul style="list-style-type: none"> <li>• Diez, D. M.; Barr, C. D. and Çetinkaya-Rundel, M. (2015): <i>Open-Intro Statistics</i>, 3<sup>rd</sup> ed., Scotts Valley: CreateSpace Independent Publishing Platform</li> <li>• Schiller, J.J.; Srinivasan, R. A. and Spiegel, M. R. (2013): <i>Schaum's outline of Probability and Statistics</i>, 4<sup>th</sup> ed., New York: McGraw-Hill.</li> <li>• Sullivan, M. (2017): <i>Statistics: Informed Decisions Using Data</i>, 5<sup>th</sup> ed., London: Pearson.</li> </ul>

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## MSDE - Material Sciences and Design

Module profile			
Module ID	MSDE		
Module name	Material Sciences and Design		
Exam number	3811400		
Duration	1 semester		
Frequency	Winter semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	SU (=seminar-like lecture)		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. A. Hofmann
Lecturer(s)	Prof. Dr. Bunsen; Prof. Dr. Felsner; Prof. Dr. A. Hofmann; Prof. Dr. J. Meyer; Prof. Dr. T. Müller; Prof. Dr. Spielfeld; Prof. Dr. Tiesler; Prof. Dr. Vogt
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 1 <sup>st</sup> semester Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	-

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO
Examination - length/format	90-120 minutes The concrete length of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course " <a href="#">Studien- und Prüfungsangelegenheiten/study and examination matters</a> ".
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

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Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Understand and judge the behaviour of different materials.</li> <li>• Draw and interpret technical drawings.</li> <li>• Name the most important machine components and their functions.</li> <li>• Comprehend and explain the function and applicability of technical standards, also with regard to commonly used production techniques.</li> </ul>
Content	<ol style="list-style-type: none"> <li><b>1. Material Sciences</b> <ul style="list-style-type: none"> <li>• Basic materials used in crystal development, thermal treatment, alloy formation</li> <li>• Elastic and plastic deformation</li> <li>• Mechanical and material properties in physics</li> </ul> </li> <li><b>2. Construction</b> <ol style="list-style-type: none"> <li>2.1 Standards and standard parts in general</li> <li>2.2 Technical drawing (lecture with lab) <ul style="list-style-type: none"> <li>• Introduction, functions, format, text fields, parts lists</li> <li>• Display modes, projections, sections</li> <li>• Dimensioning</li> <li>• Tolerances: general, dimensional, form, geometrical</li> <li>• Surface parameters</li> <li>• Display of special machine elements (screws, bearings, gaskets)</li> </ul> </li> <li>2.3 Machine elements <ul style="list-style-type: none"> <li>• General requirements and classifications</li> <li>• Screws (not: calculation)</li> <li>• Bearings (not: design)</li> </ul> </li> <li>2.4 Functional design <ul style="list-style-type: none"> <li>• Overview of production techniques</li> <li>• Design guidelines</li> </ul> </li> </ol> </li> </ol>
Literature	<ul style="list-style-type: none"> <li>• Callister, W.D. and Rethwisch, D.G. (2014): <i>Materials Science and Engineering</i>, 9. Aufl., Hoboken: Wiley &amp; Sons.</li> <li>• Childs, P. (2014): <i>Mechanical design engineering handbook</i>, Amsterdam: Elsevier Butterworth-Heinemann.</li> <li>• Grote, K.-H. (2009): <i>Springer handbook of mechanical engineering</i>, New York: Springer.</li> <li>• Parthasarathy, N.S. and Murali, V. (2015): <i>Engineering Drawing</i>, Delhi: Oxford University Press.</li> <li>• <i>Schaeffler Technical Pocket Guide</i> (2017), Herzogenaurach: Schaeffler Technologies AG &amp; Co.KG, available for free at Schaeffler's Web portal, see „media“.</li> </ul>

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## ECSB - Economic Sciences - Basics

Module profile			
Module ID	ECSB		
Module name	Economic Sciences - Basics		
Exam number	3821500		
Duration	1 semester		
Frequency	Winter and summer semester (WS in IBE; SS in IBL)		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	SU (=seminar-like lecture)		
Language of instruction	English		

Organisation		
Responsible	Prof. Dr. Huttelmaier	
Lecturer(s)	Prof. Dr. Farmanara; Prof. Dr. Huttelmaier; Prof. Dr. T. Schmitt	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 1 <sup>st</sup> semester  Core module -	IBL 2 <sup>nd</sup> semester  Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-	
Recommended prerequisites for the participation in the <b>module</b>	-	

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO
Examination - length/format	90-120 minutes The concrete length of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">"Studien- und Prüfungsangelegenheiten/study and examination matters"</a> .
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

### Learning outcomes, content and literature

Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Understand and use basic terminology of the core business functions R&amp;D, purchasing and materials management, logistics, production, and sales.</li> <li>• State the central goals and most important elements of these business functions.</li> <li>• Recognize and classify realizations of these business function elements.</li> <li>• Understand and assign fundamental concepts, frameworks, and models for these business functions.</li> </ul>
Content	<p><b>1. Elements of general business administration:</b></p> <ul style="list-style-type: none"> <li>• Constitutive corporate decisions: Location, legal form, cooperations</li> <li>• Structure and meaning of a balance sheet as well as a profit and loss statement</li> </ul> <p><b>2. Business functions and value creation processes:</b></p> <ul style="list-style-type: none"> <li>• Introduction into research and development/innovation management</li> <li>• Introduction into purchasing and materials management</li> <li>• Introduction into production</li> <li>• Introduction into sales</li> <li>• Secondary/supportive functions</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Bovee, C.L. and Thill, J.V. (2016): <i>Business in Action</i>, 8<sup>th</sup> ed., London: Pearson.</li> <li>• Ebert, R.J. and Griffin, R.W. (2019): <i>Business Essentials</i>, 12<sup>th</sup> ed., London: Pearson.</li> <li>• Nickels, W.; McHugh, J. and McHugh, S. (2013): <i>Business: Connecting Principles to Practice</i>, 2<sup>nd</sup> ed., New York: McGraw-Hill Education.</li> </ul>

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## ENBE - English for Business and Engineering

Module profile			
Module ID	ENBE		
Module name	English for Business and Engineering		
Exam number	3811600		
Duration	1 semester		
Frequency	Winter semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	SU (= seminar-like lecture)		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. Wunderlich
Lecturer(s)	Ms. Körner; Prof. Dr. Wunderlich
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 1 <sup>st</sup> semester Core Module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	Recommended entry level: B2

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO
Examination - length/format	90-120 minutes The concrete length of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">"Studien- und Prüfungsangelegenheiten/study and examination matters"</a> .
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.



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Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Understand with ease most types of written and particularly spoken linguistic interaction (e-mail writing, discussions, and, particularly, oral presentations using PowerPoint).</li> <li>• Use a differentiated academic and subject-specific vocabulary.</li> <li>• Apply their knowledge in correct grammatical, and stylistic structures.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Studying Business and Engineering: Talking about one's studies</li> <li>• Language learning Skills</li> <li>• Technology in Use: describing and explaining technical functions and applications</li> <li>• Materials technology: describing and categorising specific materials and discussing quality issues</li> <li>• Operations Management and Manufacturing: explaining and assessing operations management and manufacturing techniques</li> <li>• Breaking point: describing types of technical problem and discussing repairs and maintenance</li> <li>• Technical Developments: discussing technical requirements</li> <li>• Politeness strategies and developing intercultural competence</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Brieger, N. and Pohl, A. (2002): <i>Technical English</i>, Oxford: Summertown Publishing.</li> <li>• Emmerson, P. (2007): <i>Business English Handbook Advanced</i>, London: Macmillan Education.</li> <li>• Ibbotson, M. (2009): <i>Professional English in Use: Engineering. Technical English for Professionals</i>, Cambridge: Cambridge University Press.</li> <li>• Kavanagh, M. (2007): <i>English for the Automobile Industry</i>, Oxford: Oxford University Press.</li> <li>• Wallwork, A. (2014): <i>E-mail and Commercial Correspondence. A Guide to Professional English</i>, Berlin: Springer Science + Business Media.</li> <li>• Further literature and materials, such as topical journal or newspaper articles related to the field, will be presented by the instructor in the course and on e-learning as need arises.</li> </ul>

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## MATA - Mathematics - Advanced

Module profile			
Module ID	MATA		
Module name	Mathematics - Advanced		
Exam number	3812100		
Duration	1 semester		
Frequency	Summer semester		
Credit hours (SWS)	6		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	90	60
Teaching format	SU (=seminar-like lecture) (4 SWS); Ü (= exercise course) (2 SWS)		
Language of instruction	English		

Organisation				
Responsible	Prof. Dr. Bier			
Lecturer(s)	Dr. Bauchspieß; Prof. Dr. Bier; Prof. Dr. Bletz-Siebert; Prof. Dr. Bodewig; Prof. Dr. Diethelm; Prof. Dr. Fabeck; Dr. Latour; Prof. Dr. H.-J. Meier; Prof. Dr. Wimmer; Prof. Dr. Zirkelbach			
Applicability;	-	IBE	-	-
Semester according to SPO;	-	2 <sup>nd</sup> semester	-	-
Type of module;	-	Core module	-	-
If applicable specialisation	-	-	-	-
Particular conditions for the participation in the <b>module</b> according to the SPO	-			
Recommended prerequisites for the participation in the <b>module</b>	Successful participation in the module MATB and mathematical knowledge on advanced school level: elementary logic, sets, maps, real-valued functions			

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO
Examination - length/format	90-120 minutes The concrete length of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course " <a href="#">Studien- und Prüfungsangelegenheiten/study and examination matters</a> ".
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

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### Learning outcomes, content and literature

Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Understand the mathematical foundations which are relevant for mathematically oriented modules of higher semesters.</li> <li>• Apply important concepts and methods to problems in business and engineering.</li> <li>• Select suitable mathematical models for solving simple problems from industry and economy.</li> <li>• Solve mathematical routine tasks and interpret the results.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Matrices</li> <li>• Systems of linear of equations</li> <li>• Linear optimisation</li> <li>• Infinite series</li> <li>• Functions of multiple real variables</li> <li>• Calculus of functions of multiple real variables</li> <li>• Ordinary differential equations</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Ghorpade, S.R. and Limaye, B.V. (2018): <i>A Course in Calculus and Real Analysis</i>, Cham: Springer.</li> <li>• Jeffrey, A. (2005): <i>Mathematics for engineers and scientists</i>, Boca Raton: Chapman &amp; Hall.</li> <li>• Olver, P.J. and Shakiban, C. (2018): <i>Applied Linear Algebra</i>, Cham: Springer.</li> <li>• Stroud, K.A. and Booth, D.J. (2013): <i>Engineering Mathematics</i>, Houndmills, Basingstoke: Palgrave Macmillan.</li> <li>• Xin-She, Z. (2017): <i>Engineering mathematics with examples and applications</i>, London: Academic Press.</li> </ul>

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## TEME - Technical Mechanics

Module profile			
Module ID	TEME		
Module name	Technical Mechanics		
Exam number	3812200		
Duration	1 semester		
Frequency	Winter and summer semester (SS in IBE; WS in IBL)		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	SU (= seminar-like lecture)		
Language of instruction	English		

Organisation		
Responsible	Prof. Dr. Schreiber	
Lecturer(s)	Prof. Dr. Kharitonov; Prof. Dr. Lenz; Prof. Dr. Schreiber	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 2 <sup>nd</sup> semester  Core module -	IBL 3 <sup>rd</sup> semester  Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-	
Recommended prerequisites for the participation in the <b>module</b>	Successful completion of the modules MATB and PHYC.	

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO
Examination - length/format	90-120 minutes The concrete length of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">"Studien- und Prüfungsangelegenheiten/study and examination matters"</a> .
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

### Learning outcomes, content and literature

Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Describe the basic concepts in engineering mechanics to compose and decompose forces and moments acting on a rigid body.</li> <li>• Name the method of sections.</li> <li>• Derive and solve the governing equations in order to compute external and internal reaction forces and moments as well as stress resultants in a straight beam.</li> <li>• Solve basic problems in the field of static and kinetic friction.</li> <li>• Scrutinize their results and to judge the influence of changed parameters on their findings.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Composition of forces and equilibrium conditions in concurrent and general systems of forces.</li> <li>• Characteristic properties of joints and supports</li> <li>• Center of Gravity, center of mass, centroids</li> <li>• Method of sections, Newton's Laws</li> <li>• Determination of support reactions and stress resultants</li> <li>• Planar systems of forces and rigid bodies (e. g. trusses)</li> <li>• Static and kinetic friction, belt friction</li> </ul>
Literature	Gross, D.; Hauger, W.; Schröder, J.; Wall, W. and Rajapakse, N. (2012): <i>Engineering Mechanics 1</i> , 2 <sup>nd</sup> ed., Berlin: Springer.

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## ELEN - Fundamentals of Electrical Engineering

Module profile			
Module ID	ELEN		
Module name	Fundamentals of Electrical Engineering		
Exam number	3812300		
Duration	1 semester		
Frequency	Winter and summer semester (WS in IBL; SS in IBE)		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	SU (=seminar-like lecture)		
Language of instruction	English		

Organisation		
Responsible	Prof. Dr. N.N.	
Lecturer(s)	Prof. Dr. Brandenstein-Köth; Kothari, P.; Prof. Dr. Willert	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 2 <sup>nd</sup> semester  Core module -	IBL 3 <sup>rd</sup> semester  Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-	
Recommended prerequisites for the participation in the <b>module</b>	-	

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO
Examination - length/format	90-120 minutes The concrete length of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a> .
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Understand the basic electrical terms with physical background.</li> <li>• Understand the laws and connections of electrical engineering.</li> <li>• Understand simple electrical networks (with real and complex resistances).</li> <li>• Apply the laws to simple electrical networks.</li> <li>• Calculate simple electrical networks.</li> <li>• Analyze simple electronic circuits.</li> </ul>
Content	<p>The following topics will be covered and deepened with examples and exercises:</p> <p><b>Part A: Basic electrical quantities and terms</b></p> <ul style="list-style-type: none"> <li>• Charge, charge carrier, current flow, current density, specific resistance, temperature dependence of the resistance, electrical power and energy</li> <li>• Electrostatic field: field strength, field lines, electrical voltage and potential, Coulomb's law</li> <li>• Structure of important components: Resistance, capacitor and capacitance, coil and inductance</li> </ul> <p><b>Part B: Analysis of DC networks</b></p> <ul style="list-style-type: none"> <li>• Kirchhoff's laws</li> <li>• Ohm's law</li> <li>• Structure and calculation of networks of resistors, capacitors and inductors</li> <li>• Calculation methods for electrical networks voltage/current dividers, wye-delta conversion, Norton and Thévenin sources</li> </ul> <p><b>Part C: Alternating current technology</b></p> <ul style="list-style-type: none"> <li>• Introduction to the characteristics of alternating current</li> <li>• Phasor diagrams and complex quantities</li> <li>• Basic two poles: effective resistance, inductance and capacitance</li> <li>• Analysis of linear circuits by complex calculation</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Hagmann, G. (2013): <i>Grundlagen der Elektrotechnik</i>, 16. Auflage, Aula-Verlag.</li> <li>• Hüning, F. (2014): <i>The fundamentals of electrical engineering</i>, De Gruyter Oldenbourg.</li> <li>• Prasad, R. (2014): <i>Fundamentals of electrical engineering</i>, PHI learning.</li> </ul>

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## INTL - International Trade Law

Module profile			
Module ID	INTL		
Module name	International Trade Law		
Exam number	3812400		
Duration	1 semester		
Frequency	Winter and summer semester (WS in IBL; SS in IBE)		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	SU (=seminar-like lecture)		
Language of instruction	English		

Organisation		
Responsible	Prof. Dr. Ehret	
Lecturer(s)	Prof. Dr. Ehret; Prof. Dr. Meyer	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 2 <sup>nd</sup> semester  Core module -	IBL 1 <sup>st</sup> semester  Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-	
Recommended prerequisites for the participation in the <b>module</b>	-	

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO
Examination - length/format	90-120 minutes The concrete length of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">"Studien- und Prüfungsangelegenheiten/study and examination matters"</a> .
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.



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### Learning outcomes, content and literature

Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Classify facts with reference to private business law correctly and to judge them in a correct legal way.</li> <li>• Explain the basic institutions of private business law.</li> <li>• Make operational decisions also taking into account legal norms.</li> <li>• Explain the conclusion of contracts and the creation of statutory obligations.</li> <li>• Interpret contracts.</li> <li>• Explain questions of ownership and possession.</li> <li>• Recognize the influence of commercial law on civil law.</li> </ul>
Content	<p>Fundamentals of international trade law, i.e. WTO and GATT, CISG, and in particular:</p> <ul style="list-style-type: none"> <li>• Conclusion and implementation of contracts and pre-contractual obligations, including the right to disrupt performance</li> <li>• Principles of statutory obligations</li> <li>• Important players in international trade</li> <li>• Customs and taxes</li> <li>• Introduction to international mergers &amp; acquisitions.</li> <li>• Mechanism of dispute resolution: state courts and arbitration panels</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• August, R.A; Mayer, D. and Bixby, M.B (2012): <i>International Business Law: International Ed.: Text, Cases, and Readings</i>, 6<sup>th</sup> ed., London: Pearson Education Limited.</li> <li>• Herdegen, M. (2016): <i>Principles of International Economic Law</i>, 2<sup>nd</sup> ed., Oxford: Oxford University Press.</li> <li>• Kratz, A.W. (2006): <i>Remedies for breach of contract under the CISG. International review of law and economics</i>, pages 378-396, volume 25, Issue 3, Amsterdam: Elsevier B.V.</li> <li>• Schweizer, I.; Fountoulakis, C. and Dimsey, M. (2019): <i>International Sales Law, a guide to the CISG</i>, 3<sup>rd</sup> ed., Oxford: Hart Publishing.</li> </ul>

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## BPRO - Business Processes

Module profile			
Module ID	BPRO		
Module name	Business Processes		
Exam number	3812500		
Duration	1 semester		
Frequency	Summer semester		
Credit hours (SWS)	6		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	90	60
Teaching format	SU (=seminar-like lecture)		
Language of instruction	English		

Organisation				
Responsible	Prof. Dr. Dobhan			
Lecturer(s)	Ms. Chua; Prof. Dr. Dobhan; Prof. Dr. Knobloch; Mr. Senner			
Applicability;	-	IBE	-	-
Semester according to SPO;	-	2 <sup>nd</sup> semester	-	-
Type of module;	-	Core module	-	-
If applicable specialisation	-	-	-	-
Particular conditions for the participation in the <b>module</b> according to the SPO	-			
Recommended prerequisites for the participation in the <b>module</b>				

Examination	
Particular conditions for the participation in the examination according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO <b>or</b> soP (= other examined assignment) according to §§ 26, 27 APO
Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>◦ seminar paper/research project</li> <li>◦ portfolio assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>

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Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Define and describe important terms and concepts in the field of business processes.</li> <li>• Use methods of business process modelling.</li> <li>• Recognize possibilities for the optimization of business processes and plan their realization.</li> <li>• Execute the most important software-based core business processes of a company.</li> <li>• Capture the context and the integration of the most important production-related data, functions and documents in business.</li> <li>• Identify, collect, assess and transfer relevant and necessary data for the software-supported execution of real business processes.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Fundamentals of process management, process modeling, process optimization and process execution</li> <li>• Business Process Modeling with BPMN</li> <li>• Methods of process design, process optimization and business process management</li> <li>• Structure, sub-processes and activities of operational, production-related business processes</li> <li>• Business documents and operational functions</li> <li>• Dissemination and functionality of operational planning systems as actors of a business process</li> <li>• Relevant data types and sources for software-supported business processes</li> <li>• Types of integration in the context of software-supported business processes</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Akhtar, J. and Murray, M. (2018): <i>Materials Management with SAP S/4HANA</i>, Bonn: Rheinwerk Publishing.</li> <li>• Allweyer, T. (2015): <i>BPMN 2.0 – Introduction to the Standard for Business Process Modeling</i>, 2<sup>nd</sup> ed., Norderstedt: Books on Demand.</li> <li>• Bardhan D.; Baumgartl, A.; Choi, N.-S.; Dudgeon, M.; Lahiri, A.; Meijerink, B. and Worsley-Tonks, A. (2019): <i>SAP S/4HANA: An Introduction</i>, 3<sup>rd</sup> ed., Boston: Rheinwerk Publishing.</li> <li>• Dumas, M.; La Rosa, M.; Mendling, J. and Reijers, H.A. (2018): <i>Fundamentals of Business Process Management</i>, 2<sup>nd</sup> ed., Berlin: Springer. DOI: <a href="https://doi.org/10.1007/978-3-662-56509-4">https://doi.org/10.1007/978-3-662-56509-4</a>.</li> <li>• Ganesh, K.; Mohapatra, S.; Anbuudayasankar, S.P. and Sivakumar, P.: <i>Enterprise Resource Planning</i>, Cham: Springer International AG, DOI: <a href="https://doi.org/10.1007/978-3-319-05927-3">https://doi.org/10.1007/978-3-319-05927-3</a>.</li> <li>• Laplante, P. A. (2017). <i>Requirements engineering for software and systems</i>, New York: Auerbach Publications.</li> <li>• Laudon, K. C. and Laudon, J.P. (2018): <i>Management Information Systems</i>, 15<sup>th</sup> ed., Harlow: Pearson Education Limited.</li> <li>• Silver, B. (2011): <i>BPMN Method &amp; Style – With BPMN Implementer's Guide</i>, 2<sup>nd</sup> ed., Aptos: Cody-Cassidy Press.</li> </ul>

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## ECS2 - Economic Sciences 2

Module profile			
Module ID	ECS2		
Module name	Economic Sciences 2		
Exam number	3822600		
Duration	1 semester		
Frequency	Winter and summer semester (SS in IBE; WS in IBL)		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	SU (=seminar-like lecture)		
Language of instruction	English		

Organisation		
Responsible	Prof. Dr. Schulz	
Lecturer(s)	Prof. Dr. Farmanara; Prof. Dr. Schulz	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 2 <sup>nd</sup> semester  Core module -	IBL 3 <sup>rd</sup> semester  Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-	
Recommended prerequisites for the participation in the <b>module</b>	Successful passing of the module ECSB.	

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO
Examination - length/format	90-120 minutes The concrete length of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">"Studien- und Prüfungsangelegenheiten/study and examination matters"</a> .
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

## Learning outcomes, content and literature

Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <p><b>Part: Customer oriented management/marketing</b></p> <ul style="list-style-type: none"> <li>• Identify basic marketing terms and relevant methods of marketing and know their historical origins (beginnings of marketing until modern) and explain the differences between existing, dominant marketing paradigms.</li> <li>• Differentiate basic terms, relationships and instruments to identify and develop dynamics with relevance to markets (e.g. segmentation).</li> <li>• Define the basics of strategic marketing and to evaluate the strategic prerequisites of a company in relation to its success.</li> <li>• Differentiate and apply methods of market research.</li> </ul> <p><b>Part: Organization, strategy, and company</b></p> <ul style="list-style-type: none"> <li>• Know the most important instruments of strategic analysis and can apply them to straightforward business situations.</li> <li>• Explain the most important organizational structures, their related characteristics, and how they affect organizational behavior.</li> <li>• Identify and understand specifics of corporate cultures.</li> <li>• Recognize and classify leader behavior, leadership styles, as well as underlying attitudes, values, and behavioral patterns.</li> </ul>
Content	<p><b>Part: Customer oriented management/marketing</b></p> <ul style="list-style-type: none"> <li>• The role of marketing in customer-oriented corporate leadership</li> <li>• Normative marketing (e.g. vision, mission, goals)</li> <li>• Strategic marketing (e.g. SWOT-analysis, positioning, strategies)</li> <li>• Operative marketing (e.g. marketing instruments, customer orientation, organisation)</li> <li>• Marketing in flux (e.g. importance of paradigms)</li> </ul> <p><b>Part: Organization, strategy, and company</b></p> <ul style="list-style-type: none"> <li>• Instruments of strategic analysis (industry analysis, external environment, competence analysis and development, business models) and business strategies (differentiation, cost leadership, niches)</li> <li>• Organizational structure (forms, contingencies)</li> <li>• Organizational design and organizational culture</li> <li>• Roles, and traits of managers/leaders</li> <li>• Norms, motives, attitudes, and values as determinants of (leader) behavior</li> <li>• Leadership: styles, contingency theories, leader-member exchange theory, power</li> </ul>

Literature	<ul style="list-style-type: none"> <li>• Grant, R.M. (2013): <i>Contemporary Strategy Analysis</i>, 8<sup>th</sup> ed., Hoboken, NJ: Wiley.</li> <li>• Johns, G. and Saks, A. (2011): <i>Organizational Behavior. Understanding and Managing Life at Work</i>, 8<sup>th</sup> ed., London: Pearson.</li> <li>• Jones, G.R. (2013): <i>Organizational Theory, Design and Change</i>, 7<sup>th</sup> ed., London: Pearson.</li> <li>• Kotler, P.; Armstrong, G.; Harris, L.C. and Piercy, N. (2013): <i>Principles of Marketing</i>, 6<sup>th</sup> ed., Harlow: Pearson Education Limited.</li> <li>• Kotler, P. and Keller, K.L. (2012): <i>Marketing Management</i>, 14<sup>th</sup> ed., Pearson Education Limited.</li> <li>• Kotler, P.; Keller, K.L. and Opresnik (2015): <i>Marketing Management 14 - Konzepte, Instrumente, Unternehmensfallstudien</i>, Harlow: Pearson Education Limited.</li> <li>• Malhotra, N.K.; Birks, D.F. and Wills, P. (2012): <i>Marketing Research - An Applied Approach</i>, 6<sup>th</sup> ed., Harlow: Pearson Education Limited.</li> <li>• Robbins, S.P. and Coulter, M. (2016): <i>Management</i>, 13<sup>th</sup> ed., London: Pearson.</li> </ul>
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## EMSY - Electronic Measurements and System Engineering

Module profile			
Module ID	EMSY		
Module name	Electronic Measurements and System Engineering		
Exam number	3813100		
Duration	1 semester		
Frequency	Winter semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	SU (=seminar-like lecture)		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. Hansmann
Lecturer(s)	Prof. Dr. Ali; Prof. Dr. Hansmann; Prof. Dr. Hartmann; Prof. Dr. Spiertz
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 3 <sup>rd</sup> semester Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	-

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO
Examination - length/format	90-120 minutes The concrete length of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">"Studien- und Prüfungsangelegenheiten/study and examination matters"</a> .
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

### Learning outcomes, content and literature

Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ol style="list-style-type: none"> <li><b>1. Measurement Engineering</b> <ul style="list-style-type: none"> <li>Understand the basics of measurement technology.</li> <li>Explain classification of measurement technology and the dynamic behaviour of measuring instruments.</li> <li>Explain sampling techniques and A/D conversions.</li> </ul> </li> <li><b>2. Systems Engineering</b> <ul style="list-style-type: none"> <li>Know classifications of technical systems.</li> <li>Describe dynamic systems from different fields of physics</li> <li>Test for linearity.</li> <li>Solve the describing differential equations and discuss system properties.</li> <li>Use the Fourier-Transformation.</li> </ul> </li> </ol>
Content	<ol style="list-style-type: none"> <li><b>1. Measurement Engineering</b> <ul style="list-style-type: none"> <li>introduction and fundamentals</li> <li>uncertainty considerations</li> <li>response time of measurement devices</li> <li>fundamentals of analogue and digital measurement devices</li> </ul> </li> <li><b>2. Systems Engineering</b> <ul style="list-style-type: none"> <li>introduction to systems theory</li> <li>description of mechanical, electrical systems and systems in process engineering</li> <li>difference between static and dynamic systems</li> <li>introduction to numerical approaches to solve system equations</li> <li>system properties</li> <li>stability of systems</li> <li>Fourier-Transformation and solution of system equations</li> </ul> </li> </ol>
Literature	<ul style="list-style-type: none"> <li>Dekker, R. (2017): <i>Applied Systems Theory</i>, 2<sup>nd</sup> ed., Berlin: Springer-Verlag.</li> <li>Skyttner, L. (2008): <i>General Systems Theory</i>, 2<sup>nd</sup> ed., Singapur: World Scientific Publishing Company.</li> <li>Additional information for literature will be provided in class.</li> </ul>



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## COSE - Computer Sciences for Engineers

Module profile			
Module ID	COSE		
Module name	Computer Sciences for Engineers		
Exam number	3813200		
Duration	1 semester		
Frequency	Winter semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	SU (= seminar-like lecture), Ü (= exercise course)		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. Diethelm
Lecturer(s)	Dr. Bauchspieß; Prof. Dr. Diethelm; Prof. Dr. Knobloch; Prof. Dr. Motzek; Prof. Dr. Zirkelbach
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 3 <sup>rd</sup> semester Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	-

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO
Examination - length/format	90-120 minutes The concrete length of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course " <a href="#">Studien- und Prüfungsangelegenheiten/study and examination matters</a> ".
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

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Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Know the fundamentals of programming and apply selected programming techniques.</li> <li>• Implement simple algorithms in a high level programming language using basic data types and simple data structures.</li> <li>• Analyse simple programming problems and formulate algorithms for their solution.</li> <li>• Identify and define network devices and protocols.</li> <li>• Explain communication between network devices.</li> <li>• Differentiate various types of databases.</li> <li>• Develop and apply database structures.</li> <li>• Describe the foundations of hardware and software technology.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Data types and variables</li> <li>• Expressions and operators</li> <li>• Instruction sets</li> <li>• Control structures</li> <li>• Functions, procedures and modularization</li> <li>• Software development process, supply and licensing models</li> <li>• Introduction to networks</li> <li>• Database design and use on the basis of SQL</li> <li>• Software architectures</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Brookshear, J. G. (2012): <i>Computer Science: An Overview</i>, 11<sup>th</sup> ed., Boston: Addison Wesley.</li> <li>• Coronel, C. and Morris, S. (2016): <i>Database Systems: Design, Implementation, and Management</i>, 12<sup>th</sup> ed., Boston: Cengage Learning.</li> <li>• Downey, A. B. (2015): <i>Think Python</i>, 2<sup>nd</sup> ed., Needham: Green Tea Press; <a href="https://greenteapress.com/wp/think-python-2e/">https://greenteapress.com/wp/think-python-2e/</a></li> <li>• Kurose, J. F. and Ross, K. W. (2017): <i>Computer Networking: A Top-Down Approach</i>, 7<sup>th</sup> ed. Boston: Pearson.</li> <li>• Langtangen, H. P. (2016): <i>A Primer on Scientific Programming with Python</i>, 5<sup>th</sup> ed. Berlin: Springer.</li> <li>• Mir, N. F. (2015): <i>Computer and Communication Networks</i>, 2<sup>nd</sup> ed., Upper Saddle River: Pearson Education.</li> <li>• Further suggestions can be found at <a href="https://www.python.org">https://www.python.org</a> under "Documentation/Python Books".</li> </ul>

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## TESY - Introduction to Technical Systems

Module profile			
Module ID	TESY		
Module name	Introduction to Technical Systems		
Exam number	3813300		
Duration	1 semester		
Frequency	Winter semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	SU (= seminar-like lecture)		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. Zink
Lecturer(s)	Prof. Dr. Sommer; Prof. Dr. Ziegler
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 3 <sup>rd</sup> semester Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	-

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination)
Examination - length/format	90-120 minutes The concrete length of the examination will be determined in the curriculum and published at the beginning of each semester in the eLearning course " <a href="#">Studien- und Prüfungsangelegenheiten/study and examination matters</a> ".
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should know/be able:</p> <ul style="list-style-type: none"> <li>• The set-ups and functions of technical systems.</li> <li>• To understand and recall this knowledge through application engineering.</li> <li>• The classification possibilities and functionalities of the most important components in technical systems.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Technical systems <ul style="list-style-type: none"> <li>○ Development and functionality</li> <li>○ Design principles, technical and functional specifications</li> </ul> </li> <li>• Examples of application of technical systems</li> <li>• Components of technical systems explained using the example automated systems (e.g. robotic systems) <ul style="list-style-type: none"> <li>○ Kinematic configuration</li> <li>○ Types of drives and transmissions</li> <li>○ Sensors and measuring systems</li> <li>○ Control system</li> <li>○ Programming</li> <li>○ Operational behaviour of technical systems</li> </ul> </li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Gausemeier, J.; Rammig, F.J. and Schäfer, W. (2014): <i>Design Methodology for Intelligent Technical Systems</i>, Heidelberg: Springer Verlag.</li> <li>• Gupta, A.K.; Arora, S.K. and Westcott, J.R. (2016): <i>Industrial Automation and Robotics</i>, Sterling: Mercury Learning and Information.</li> <li>• Isermann, R. (2005): <i>Mechatronic Systems (Fundamentals)</i>, London: Springer Verlag.</li> <li>• Madrid, N.M. and Seepold R. (2008): <i>Intelligent Technical Systems</i>, Heidelberg: Springer Verlag.</li> <li>• Additional information about literature will be provided in class.</li> </ul>

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## ACCO - Accounting

Module profile			
Module ID	ACCO		
Module name	Accounting		
Exam number	3823400		
Duration	1 semester		
Frequency	Winter and summer semester (WS in IBE; SS in IBL)		
Credit hours (SWS)	6		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	90	60
Teaching format	SU (= seminar-like lecture)		
Language of instruction	English		

Organisation		
Responsible	Prof. Dr. Ankenbrand	
Lecturer(s)	Prof. Dr. Ankenbrand; Prof. Dr. Kraus; Prof. Dr. T. Schmitt (starting SS 2020); Prof. Dr. M. Walter	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 3 <sup>rd</sup> semester  Core module -	IBL 2 <sup>nd</sup> semester  Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-	
Recommended prerequisites for the participation in the <b>module</b>	Successful passing of the module ECSB.	

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO
Examination - length/format	90-120 minutes The concrete length of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a> .
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Explain the differences between financial and managerial accounting.</li> <li>• Identify the basic principles of annual financial statements.</li> <li>• Solve simple questions of approach and assessment.</li> <li>• Classify cost accounting terms.</li> <li>• Interpret cost trends and apply overhead costs.</li> <li>• Apply activity based costing.</li> <li>• Explain the concept of the time value of money.</li> <li>• Apply methods of investment calculation adequate to the target.</li> </ul>
Content	<p><b>Financial Accounting</b></p> <ul style="list-style-type: none"> <li>• Reasons for Accounting Differences and Need for Globally Converged Accounting Standards</li> <li>• The International Accounting Standards Board</li> <li>• Role and Structure of the IFRS</li> <li>• Major Accounting Issues under IFRS</li> </ul> <p><b>Management Accounting</b></p> <ul style="list-style-type: none"> <li>• Basics of cost- and activity accounting</li> <li>• Cost type calculations</li> <li>• Cost center calculations</li> <li>• Overhead and cost unit calculations</li> <li>• Basics of controlling</li> </ul> <p><b>Basic Corporate Finance</b></p> <ul style="list-style-type: none"> <li>• Time Value and Investment Decisions</li> <li>• Financial Planning</li> <li>• Risk and Return Relationship</li> <li>• Risk and uncertainty in investment decisions</li> <li>• Long and short term finance</li> <li>• Cash and Inventory management</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Berk, J. and DeMarzo, P. (2013): <i>Corporate Finance</i>, 3<sup>rd</sup> ed., Boston: Pearson Education.</li> <li>• Brealey, R.; Myers, S. and Allen, F. (2010): <i>Principles of Corporate Finance - Concise Ed.</i>, 2<sup>nd</sup> ed., New York: McGraw-Hill Education.</li> <li>• Britton, A.; Hoogendoorn, M.; Jorissen, A.; van Mourik, C. and Alexander, D. (2014): <i>International Financial Reporting and Analysis</i>, Boston: Cengage Learning.</li> <li>• Rich, J.; Jones, J.; Heitger, D.; Mowen, M. and Hansen, D. (2012): <i>Financial and Managerial Accounting. The Cornerstone of Business Decisions</i>, 2<sup>nd</sup> ed., Boston: Cengage Learning.</li> <li>• Stolowly, H.; Lebas, M. and Ding, Y. (2017): <i>Financial Accounting and Reporting A Global Perspective</i>, 5<sup>th</sup> ed., Boston: Cengage Learning.</li> <li>• Weber, J.; and Schäfer, U. (2008): <i>Introduction to Controlling</i> 1<sup>st</sup> ed., Stuttgart: Schäffer-Poeschel.</li> </ul>

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## HRMG - Human Resources Management

Module profile			
Module ID	HRMG		
Module name	Human Resources Management		
Exam number	3813500		
Duration	1 semester		
Frequency	Winter semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Type of class(es)	SU (=seminar-like lecture)		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. Stadelmann
Lecturer(s)	Prof. Dr. Stadelmann
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 3 <sup>rd</sup> semester Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	-

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO
Examination - length/format	90-120 minutes The concrete length of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">"Studien- und Prüfungsangelegenheiten/study and examination matters"</a> .
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

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### Learning outcomes, content and literature

Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Name the most important components of Human Resources Management, as needed by Business Engineers in an international business environment.</li> <li>• Recognize the influence of economic conditions on the objectives and tasks of Human Resources Management.</li> <li>• Explain the importance of Human Resources instruments for the implementation of corporate goals.</li> <li>• Analyse, assess and solve personnel problems in an international business environment.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Introduction and Overview</li> <li>• Key fields of Action in Human Resources Management (HR Planning and Job Analysis, Talent Acquisition, Organisation of Work, Training and Development, Leadership and Performance Management, Total Compensation)</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Dessler, G. (2015): <i>Human Resource Management</i>, 14<sup>th</sup> ed., Boston: Pearson.</li> <li>• Dowling, P.J.; Festing, M. and Engle, A. D. (2017): <i>International Human Resource Management</i>, 7<sup>th</sup> ed., Andover: Cengage Learning.</li> <li>• Noe, R. A.; Hollenbeck, J. R.; Gerhart, B. and Wright, P. M. (2015): <i>Human Resource Management</i>, 9<sup>th</sup> ed., New York: McGraw Hill Education.</li> <li>• Syed, J. and Kramar, R. (2018): <i>Human Resource Management. A Global and Critical Perspective</i>, 2<sup>nd</sup> ed., London: Palgrave.</li> </ul>



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## PMSW - Project Management and Scientific Working

Module profile			
Module ID	PMSW		
Module name	Project Management and Scientific Working		
Exam number	3823600		
Duration	1 semester		
Frequency	Winter and summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation		
Responsible	Prof. Dr. Schmidt	
Lecturer(s)	Prof. Dr. Beer; Prof. Dr. Gampl; Prof. Dr. Scheller; Prof. Dr. Schmidt; Prof. Dr. Stadelmann	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 3 <sup>rd</sup> semester  Core module -	IBL 2 <sup>nd</sup> semester  Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-	
Recommended prerequisites for the participation in the <b>module</b>	-	

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO <b>or</b> soP (= other examined assignment) according to §§ 26, 27 APO
Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP: documentation report</li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

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### Learning outcomes, content and literature

Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Describe procedures, methods and tools of conventional and agile project management.</li> <li>• Plan and document a project with regard to content and time framework conditions and to control it with the help of IT tools.</li> <li>• Identify project management problems and design solution strategies.</li> <li>• Design or derive a logical and coherent structure as well as research questions for seminar papers and bachelor theses.</li> <li>• Use the rules of correct scientific citation in a scientific work.</li> <li>• Identify scientific sources and methods relevant to the research question.</li> <li>• Develop a coherent argumentation in the work and to present the research results.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Function, types, contents and processes of conventional project management</li> <li>• Content and use of basic project documents such as project proposal, project order, work-breakdown-structure and Gantt-chart</li> <li>• Process and resource planning in projects</li> <li>• Use of an IT-tool with exercises for project planning and control</li> <li>• Communication, teamwork, self-reflection and versatility in projects</li> <li>• Introduction and practice of agile project management methods</li> <li>• Scientific citation and citation methods</li> <li>• Research questions and writing an introduction</li> <li>• Structuring of a scientific work</li> <li>• Scientific methods and empirical tools</li> <li>• Organization and planning of the bachelor thesis</li> <li>• Literature research in electronic databases and selection of suitable sources</li> <li>• Use of writing and citation programs</li> <li>• Presentation of methodological and content-related results</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Aken van, J.; Berends, H. and Bij van der, H. (2012): <i>Problem solving in organizations. A methodological handbook for business and management students</i>, Cambridge: Cambridge University Press.</li> <li>• Campell, C. (2007): <i>The One-Page-Project Manager, Communicate and manage any project with a single sheet of paper</i>. Hoboken: Wiley.</li> <li>• Easterby-Smith, M.; Thorpe, R./ and Jackson, P.R. (2015): <i>Management &amp; Business Research</i>, 5<sup>th</sup> ed., Los Angeles: SAGE.</li> <li>• Hermarij, J. (2016): <i>The Better Practices of Project Management. Based on the IPMA Competences</i>, 4<sup>th</sup> ed., Amersfoort: Van Haren Publishing.</li> <li>• Minto, B. (2009): <i>The Pyramid Principle, Logic in Writing and Thinking</i>, Harlow: Prentice Hall Education.</li> <li>• Müller, S. and Roth A. (2015): <i>Academic Writing. Guidelines for a Term Paper, Bachelor and Master Thesis</i>, Nürnberg: self-publishing.</li> </ul>

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## Second Part of Studies, Programme Semester 4 to 7

### ENG1/2/3/4 - Core Electives in Engineering (E) 1/2/3/4

Module profile			
Module code	ENG1/2/3/4		
Module name	Core Electives in Engineering (E) 1/2/3/4		
Exam number	Depends on the chosen course.		
Duration	1 semester each		
Frequency	Winter and/or summer semester Some courses are only offered once a year. Please find further information in the respective course description (see <a href="#">appendix</a> ).		
Credit hours (SWS)	4 each		
ECTS-Credits (CP)	5 each		
Workload	Total workload for each module	Amount of Attendance time for each module	Amount of Self-study time for each module
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation	
Responsible	Dean of Studies from the Faculty of Business and Engineering
Lecturer(s)	Depends on the chosen course. Please find further information in the respective course description (see <a href="#">appendix</a> ).
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE - 4 <sup>th</sup> /5 <sup>th</sup> semester Core elective module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	Successful passing of mathematical, scientific and technical modules of the first three semesters.

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Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	Depends on the chosen course. Please find further information in the respective course description (see <a href="#">appendix</a> ).
Examination - length/format	Depends on the chosen course. Please find further information in the respective course description (see <a href="#">appendix</a> ).
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	The students have profound knowledge, depending on their engineering specialisation, in mechanical engineering, and/or electrical engineering, and/or mechatronics, with knowledge in theoretical and practical application. They know the contents and laws of these technical disciplines and apply methods, depending on their technical specialisation.
Content	According to the description of the respective courses in the overall framework of Core Electives in Engineering. For the recognition of specific specialisations, two compulsory courses and two courses of choice from the course catalogue have to be completed. The offered courses can be found in the curriculum or the module handbook. Students are also able to choose courses of different fields and are then called Generalists.
Literature	Depends on the chosen course. Please find further information in the respective course description (see <a href="#">appendix</a> ).

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## PRQA - Process and Quality Assurance

Module profile			
Module ID	PRQA		
Module name	Process and Quality Assurance		
Exam number	3814300		
Duration	1 semester		
Frequency	Summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	SU (= seminar-like lecture)		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. Engelmann
Lecturer(s)	Prof. Dr. Bräutigam; Prof. Dr. Bremer; Prof. Dr. Deutschle; Prof. Dr. Engelmann; Prof. Dr. Panshef; Prof. Dr. J. Schmitt; Prof. Dr. Schwindl
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> semester Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	Successful completion of the module STAT or STAC.

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO
Examination - length/format	90-120 minutes The concrete length of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">"Studien- und Prüfungsangelegenheiten/study and examination matters"</a> .

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Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to</p> <ul style="list-style-type: none"> <li>• Explain “quality” and common terms and models of the process and quality management.</li> <li>• Evaluate the consequences of customer and process orientation.</li> <li>• Explain the structure and content of the ISO 9001 and to transfer it to realistic situations.</li> <li>• Describe and evaluate relevant quality strategies.</li> <li>• Apply FMEA as a risk management tool.</li> <li>• Apply preventive and corrective methods of quality management and to derive corrective and preventive actions.</li> <li>• Carry out calculations for machine and process capability and to evaluate the results.</li> <li>• Detect and calculate quality costs.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Traditional, rational and emotional definition of quality</li> <li>• Models of customer orientation (Kano model, value function, GAP-model)</li> <li>• Process pyramid and measurement of process performance</li> <li>• ISO 9001: Content, interpretation and application in companies</li> <li>• Quality management tools along the product life cycle: development (QFD, FMEA), procurement (supplier selection and evaluation), production (AQL, SPC, 7Q), service</li> <li>• Machine and process capability</li> <li>• Traditional and enhanced quality costs</li> <li>• Target costing</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Borror, C.M. (2008): <i>The Certified Quality Engineer Handbook</i>, 3<sup>rd</sup> ed, ASQ Press.</li> <li>• Joseph, D. and Juran, J.M. (2010): <i>Juran's Quality Handbook: The Complete Guide to Performance Excellence</i>, 6<sup>th</sup> ed., McGrawHill.</li> <li>• Tague, N.R. (2005): <i>Quality Toolbox</i>, Paperback, ASQ Press.</li> </ul>

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## BUS1/2/3/4 - Core Electives in Business (B) 1/2/3/4

Module profile			
Module ID	BUS1/2/3/4		
Module name	Core Electives in Business (B) 1/2/3/4		
Exam number	Depends on the chosen course.		
Duration	1 semester each		
Frequency	Winter and/or summer semester Some courses are only offered once a year. Please find further information in the respective course description (see <a href="#">appendix</a> ).		
Credit hours (SWS)	4 each		
ECTS-Credits (CP)	5 each		
Workload	Total workload for each module	Amount of Attendance time for each module	Amount of Self-study time for each module
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation	
Responsible	Dean of Studies from the Faculty Business and Engineering
Lecturer(s)	Depends on the chosen course. Please find further information in the respective course description (see <a href="#">appendix</a> ).
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester  Core elective module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	Successful passing of mathematical and economic modules of the first three semesters.

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	Depends on the chosen course. Please find further information in the respective course description (see <a href="#">appendix</a> ).
Examination - length/format	Depends on the chosen course. Please find further information in the respective course description (see <a href="#">appendix</a> ).
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

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### Learning outcomes, content and literature

Learning outcomes	The students have profound knowledge in their respective specialisation and courses of choice in the fields of purchasing, and/or production, and/or sales, and/or controlling, and/or digital business such as distinct knowledge in theory and practical application. They know the contents and laws of these disciplines and apply methods in the respective specialisation.
Content	<p>According to the description of the respective courses in the overall framework of Business Electives.</p> <p>For the recognition of specific specialisations, two compulsory courses and two courses of choice from the course catalogue have to be completed. The offered courses can be found in the curriculum or module handbook. Students are also able to choose courses of different fields and are then called Generalists.</p>
Literature	Depends on the chosen course. Please find further information in the respective course description (see <a href="#">appendix</a> ).



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## AMET - Analytical Methods

Module profile			
Module ID	AMET		
Module name	Analytical Methods		
Exam number	3814500		
Duration	1 semester		
Frequency	Summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	SU (= seminar-like lecture)		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. Schwindl
Lecturer(s)	Prof. Dr. Schwindl; Ms. Ullerich
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> semester Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	-

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO
Examination - length/format	90-120 minutes The concrete length of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">"Studien- und Prüfungsangelegenheiten/study and examination matters"</a> .
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

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Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Understand the fundamental concepts and methods of common and efficient quantitative analysis and planning procedures and apply these to realistic problems and data.</li> <li>• Improve business processes and business scenarios with the help of machine learning tools.</li> <li>• Understand the algorithms behind the used methods.</li> <li>• Extract information efficiently from big data quantities by using statistic procedures and modern methods of data analysis.</li> <li>• Confidently applying these methods and procedures to real data from industrial process data.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Managing and Understanding Data</li> <li>• Classification Using Nearest Neighbours</li> <li>• Probabilistic Learning - Classification Using Naïve Bayes</li> <li>• Classification using Decision Trees and Rules</li> <li>• Regression Methods</li> <li>• Neural Networks and Support Vector Machines</li> <li>• Market Basket Analysis using Association Rules</li> <li>• Clustering with k-means method</li> <li>• Evaluating Model Performance</li> <li>• Improving Model Performance</li> <li>• Specialized Machine Learning Topics</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Lantz, B. (2013): <i>Machine Learning with R</i>, Birmingham: Packt Publishing.</li> <li>• Larose, D.T. and Larose, C. D. (2015): <i>Data Mining and Predictive Analytics</i>, 2<sup>nd</sup> ed., New Jersey: Wiley &amp; Sons.</li> </ul>

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## PROD - Product Development

Module profile			
Module ID	PROD		
Module name	Product Development		
Exam number	3814600		
Duration	1 semester		
Frequency	Summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. Tiesler
Lecturer(s)	Prof. Dr. Bunsen; Prof. Dr. Engelmann; Prof. Dr. Schulz; Prof. Dr. Tiesler
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> semester Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	-

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	soP (= other examined assignment) according to §§ 26, 27 APO
Examination - length/format	<p><b>One</b> of the following formats:</p> <ul style="list-style-type: none"> <li>seminar paper/research project</li> <li>portfolio assignment</li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>

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Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Apply the fundamental methods of project management, teamwork and presentation techniques.</li> <li>• Describe the fundamentals of product development.</li> <li>• Apply the fundamentals of product development, especially the methodical set-up and methods of structured technical documentation of project results.</li> </ul>
Content	<p>Application of chosen aspects from the field of project management, methodical design and product development.</p> <ul style="list-style-type: none"> <li>• Methodical design and product development: Product development process, support such as Black Box, dynamic functionality structure, morphological box</li> <li>• Teamwork: Constructive, creative and success oriented work in an interdisciplinary and possibly international team, conflict resolution and team leading</li> <li>• Project management: Time, date and cost relevant collaboration in a complex development task with weekly status reports for the lecturer</li> <li>• Presentation techniques/documentation: short, but interesting, fundamental, but understandable presentation of the complex project task, as well as preparation of a structured documentation</li> </ul> <p>In the course of the project, a product is developed by a realistic task and worked on until the concept is elaborated.</p>
Literature	<p>Pahl, G. and Wallace, K. (2007): <i>Engineering Design - A Systematic Approach</i>, 3<sup>rd</sup> ed., London: Springer.</p>

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## APMG - Applied Project Management

Module profile			
Module ID	APMG		
Module name	Applied Project Management		
Exam number	3815600		
Duration	1 semester		
Frequency	Winter and summer semester		
Credit hours (SWS)	2		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	30	120
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. Schulz
Lecturer(s)	Prof. Dr. Schulz; Prof. Dr. Sponholz; Professors and Lecturers, partly depending on the topics.
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 5 <sup>th</sup> semester Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	Knowledge background of all courses in semesters 1, 2, 3, 4. Successful passing of the modules PMSW and PROD.

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	soP (= other examined assignment) according to §§ 26, 27 APO
Examination - length/format	<p><b>One</b> of the following formats:</p> <ul style="list-style-type: none"> <li>seminar paper/research project</li> <li>portfolio assignment</li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>

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Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Establish a project organization based on a research-based logic, including (e.g.) Gantt-diagram, resource-planning, capacity-planning.</li> <li>• Plan team roles.</li> <li>• Design a research question.</li> <li>• Research literature and evaluate it critically.</li> <li>• Apply simple, scientific models.</li> <li>• Interpret and analyse data.</li> <li>• Explain scientific methods and apply them.</li> <li>• Deduct and present results.</li> </ul>
Content	<p>The technical contents are derived from the topics of the current practical projects. The contents are essentially:</p> <ul style="list-style-type: none"> <li>• Team-oriented problem identification within the framework of the project task</li> <li>• Autonomous structuring of the approach for problem solving</li> <li>• Autonomous team-oriented conceptual work on the tasks of a project</li> <li>• Development and elaboration of presentable results</li> <li>• Presentation and discussion of the results to the partner company</li> <li>• Project documentation according to the guidelines for the elaboration of practical scientific work</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Kerzner, H. (2017): <i>Project Management: A Systems Approach to Planning, Scheduling, and Controlling</i>, 12<sup>th</sup> ed., Hoboken: John Wiley &amp; Sons.</li> <li>• Kofman, F. (2006): <i>Conscious Business. How to build value through values</i>, Boulder: Sounds True.</li> <li>• Kousholt, B. (2007): <i>Project Management - Theory and practice</i>, Copenhagen: Nyt Teknisk Forlag.</li> <li>• Lencioni, P. (2002): <i>The Five Dysfunctions of a Team</i>, San Francisco: Jossey-Bass.</li> <li>• Lock, D. (2007): <i>Project Management</i>, 9<sup>th</sup> ed., Aldershot: Gower Publishing.</li> </ul>

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## INTM - Internship Module

The Internship Module consists of

- a continuous, supervised **internship** lasting 20, but no more than 26 weeks and is
- accompanied by the seminar "**Preparation and Reflection of Internship**". (see § 6 SPO B IBE - engl.)

The internship Module is deemed to be successfully completed if

- evidence of the activities during the internship and its duration in relation to a full-time activity is provided through the employer and
- a report on the activities during the internship, signed by the employer, is available and has been approved by the supervisor of the faculty. (see § 11 (7) APO)

### PRIN - Preparation and Reflection of Internship

Module profile			
Module ID	PRIN		
Module name	Preparation and Reflection of Internship		
Exam number	3826110		
Duration	1 semester		
Frequency	Winter- and summer semester		
Teaching units per week (SWS)	2		
ECTS-Credits (CP)	2		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	60	30	30
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation		
Responsible	Prof. Dr. Farmanara (IBE); Prof. Dr. Gampl (IBL)	
Lecturer(s)	Prof. Dr. Farmanara; Prof. Dr. Gampl	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 6 <sup>th</sup> semester  Core module -	IBL 6 <sup>th</sup> semester  Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	<ul style="list-style-type: none"> <li>Acquisition of all 90 CPs of the first three regular semesters (§ 6 (2) SPO IBE and § 6 (2) SPO IBL).</li> <li>INTS, i.e. the internship must already have been conducted (at least completed to a large degree).</li> <li>Submission of the internship report.</li> </ul>	
Recommended prerequisites for the participation in the <b>module</b>	-	

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Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	Acquisition of all 90 CPs of the first three regular semesters (§ 6 (2) SPO IBE and § 6 (2) SPO IBL).
Examination - type	soP m. E./o. E. (= other examined assignment passed successfully/failed) according to § 27 APO
Examination - length/format	Multimedia Presentation resp. documentation according to § 6 (3) S. 3 SPO IBE bzw. § 6 (3) S.3 SPO IBL
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Reflect on patterns of personal behaviour and success criteria in the organizational environment.</li> <li>• Assess critically and constructively goals, structures, processes, and culture of organizations.</li> <li>• Evaluate critically and constructively their own professional behavior as well as that of colleagues and supervisors.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Interactive presentation of contents and experiences during the internship as well as elaborations on employers, industries, and functional areas</li> <li>• Discussions of experiences made during the internships</li> <li>• Comparison of experiences with personal expectations</li> <li>• Overview of a variety of job-relevant information</li> </ul>
Literature	Minto, B. (2010): <i>The Pyramid Principle</i> , 3 <sup>rd</sup> ed., Upper Saddle River, NJ: Prentice Hall.

## INTS - Internship

Module profile			
Module ID	INTS		
Module name	Internship		
Exam number	3826100		
Duration	1 semester		
Frequency	Winter and summer semester		
Teaching units per week (SWS)	0		
ECTS-Credits (CP)	28		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	840	0	840
Teaching format	Pr (= practical)		
Language of instruction	English		



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Organisation		
Responsible	Prof. Dr. Farmanara (IBE); Prof. Dr. Gampl (IBL)	
Lecturer(s)	Prof. Dr. Farmanara; Prof. Dr. Gampl	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 6 <sup>th</sup> semester  Core module -	IBL 6 <sup>th</sup> semester  Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	<ul style="list-style-type: none"> <li>Acquisition of all 90 CPs of the first three regular semesters (§ 6 (2) SPO IBE and § 6 (2) SPO IBL).</li> <li>Submission of an internship contract to students' office prior to starting the internship (§11 (5) APO).</li> </ul>	
Recommended prerequisites for the participation in the <b>module</b>	-	

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	Acquisition of all 90 CPs of the first three regular semesters (§ 6 (2) SPO IBE and § 6 (2) SPO IBL).
Examination - type	-
Examination - length/format	-
Language of examination	English
Condition for the award of credit points	Submission of certificate of employment (issued by employer at which the internship has been conducted).

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>Analyse, understand, and interpret real business processes and structures hands-on, in particular related constraints and opportunities.</li> <li>Deploy the soft skills needed in real business environments (e.g. abilities to communicate, to convince others, to manage conflicts, and to work within a team) confidently, appropriately, professionally, and in a goal-oriented manner.</li> <li>Develop systematically solutions for business challenges.</li> <li>Be fully employable on the graduate job market.</li> </ul>
Content	<ul style="list-style-type: none"> <li>Immersion in business practice</li> <li>Practical application and consolidation of knowledge, skills, and methods acquired in the degree course</li> <li>Autonomous execution of planning, organization, and control tasks in organisations</li> <li>Generation of business solutions in a specialisation area of the degree course</li> </ul>
Literature	<ul style="list-style-type: none"> <li>Will be provided by company (internal documentation).</li> <li>Standard textbooks of the relevant functional areas.</li> </ul>

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## LABT - Laboratory Tests

Module profile			
Module ID	LABT		
Module name	Laboratory Tests		
Exam number	3817100		
Duration	1 semester		
Frequency	Winter and summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	LP (= lab course)		
Language of instruction	English		

Organisation	
Responsible	Ms. Ullerich
Lecturer(s)	Depends on the chosen Laboratory Tests according to study plan IBE.
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 7 <sup>th</sup> semester Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	Proof of the participation in the introduction of the industrial safety regulations and machine protection. In some areas, the previous or parallel attendance of according lectures. The internal manual provides further information.
Recommended prerequisites for the participation in the <b>module</b>	Start after the second term

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	soP (= other examined assignment) according to §§ 27 APO
Examination - length/format	Practical coursework
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>Recall and transfer student's theoretical knowledge of the engineering science-oriented modules through the implementation of the laboratory tests and analysis of the test results.</li> <li>Gain a deeper understanding of theoretical model correlations.</li> <li>Apply the fundamentals of the industrial safety regulations and machine protection.</li> <li>Apply the testing technology, which is required in the daily work of an industrial engineer.</li> <li>Represent, analyse and describe test results in technical reports.</li> </ul>
Content	<p>The laboratory test contains of different engineering science-oriented tests (e.g. usage of measuring systems). The professional contents will be displayed in the respective instruction manual.</p> <ol style="list-style-type: none"> <li>Implementation of the test <ul style="list-style-type: none"> <li>Preparation for the particular tests in self-learning through familiarization with the help of the instruction manual and the supplementary literature as well as the repetition of the content of the appropriate module.</li> <li>Possibly an incoming inspection (depending on the test) as a prerequisite of a successful attendance.</li> <li>Experimental procedure with expert discussion regarding the test; recording the results.</li> </ul> </li> <li>Evaluation and report writing <p>Evaluation of the results and, depending on the test, writing of a report as a prerequisite of getting the grade.</p> </li> </ol>
Literature	<p>The professional literature will be notified by the respective experimenter.</p>

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## COC1 - Core Competences 1

Module profile			
Module ID	COC1		
Module name	Core Competences 1		
Exam number	3827200		
Duration	1 semester		
Frequency	Winter and summer semester		
Credit hours (SWS)	2		
ECTS-Credits (CP)	3		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	90	30	60
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation		
Responsible	Prof. Dr. Stadelmann	
Lecturer(s)	Prof. Dr. Stadelmann; N.N.	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 7 <sup>th</sup> semester  Core module -	IBL 7 <sup>th</sup> semester  Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-	
Recommended prerequisites for the participation in the <b>module</b>	Successful passing of the module PMSW.	

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	Compulsory attendance of the class.
Examination - type	soP (= other examined assignment) according to §§ 26, 27 APO
Examination - length/format	<p><b>One</b> of the following formats:</p> <ul style="list-style-type: none"> <li>• seminar paper/research project</li> <li>• multimedia presentation</li> <li>• written assignment</li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

### Learning outcomes, content and literature

Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Exhibit an accurate sense of self, make use of feedback and know personal beliefs and values.</li> <li>• Consider the perspective of others.</li> <li>• Create and apply effective communication strategies and lead effective conversations.</li> <li>• Comprehend roles, interactions and processes in a team and strive for common solutions.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Elements of self-management, including individual thinking style analysis according to the Herrmann Brain Dominance Instrument (HBDI)</li> <li>• Basic characteristics of communication</li> <li>• Communication models and techniques (comprehensibility, active listening, question technique)</li> <li>• Giving and receiving feedback</li> <li>• Preparing and conducting conversations</li> <li>• Success factors for teamwork</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Cashman, K. (2008): <i>Leadership from the inside out. Becoming a leader for life</i>, 2<sup>nd</sup> ed., San Francisco: Berrett-Koehler.</li> <li>• De Janasz, S. C.; Dowd, K. O. and Schneider, B. Z. (2012): <i>Interpersonal skills in organizations</i>, 4<sup>th</sup> ed., Boston: McGraw-Hill.</li> <li>• Herrmann, N. and Hermann,-Nehdi, A. (2015): <i>The Whole Brain Business Book</i>, 2<sup>nd</sup> ed., New York: McGraw Hill Book.</li> <li>• Solomon, D. H. and Theiss, J. (2013): <i>Interpersonal Communication. Putting theory into practice</i>, New York: Routledge.</li> </ul>

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## COC2 - Core Competences 2

Module profile			
Module ID	COC2		
Module name	Core Competences 2		
Exam number	3827300		
Duration	1 semester		
Frequency	Winter and summer semester		
Credit hours (SWS)	2		
ECTS-Credits (CP)	2		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	60	30	30
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation		
Responsible	N.N.	
Lecturer(s)	Ms. Körner; Ms. Shendrick; Prof. Dr. Stadelmann; Mr. Stüwe	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBL 7 <sup>th</sup> semester  Elective module -	IBE 7 <sup>th</sup> semester  Elective module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-	
Recommended prerequisites for the participation in the <b>module</b>	Successful passing of the module COC1.	

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	Compulsory attendance of the class.
Examination - type	soP (= other examined assignment) according to §§ 26, 27 APO
Examination - length/format	<p><b>One</b> of the following formats:</p> <ul style="list-style-type: none"> <li>• seminar paper/research project</li> <li>• multimedia presentation</li> <li>• written assignment</li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

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Learning outcomes, content and literature	
Learning outcomes	<p>After having attended the module COC1 (Core Competences 1) students have the possibility to choose a course in order to specialise in a certain field of personal core competences.</p> <p>After successful completion of a module COC2 (Core Competences 2), the student should be able to</p> <ul style="list-style-type: none"> <li>• Reproduce content from the respective field</li> <li>• Derive appropriate options for his/her own behaviour</li> <li>• Make a reflected decision for a specific behaviour and implement this in practical situations.</li> </ul>
Content	Depends on the chosen course. Please find further information in the respective COC2 module description (see <a href="#">appendix</a> ).
Literature	Depends on the chosen course. Please find further information in the respective COC2 module description (see <a href="#">appendix</a> ).

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## BPLA - Business Plan

Module profile			
Module ID	BPLA		
Module name	Business Plan		
Exam number	3817600		
Duration	1 semester		
Frequency	Winter and summer semester		
Credit hours (SWS)	2		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	30	120
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. N.N.
Lecturer(s)	M. Kriegel; M. Waschik
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 7 <sup>th</sup> semester Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	Knowledge from the basic economic science modules, in particular: ECSB, ECS2, ACCO, INTL, HRMG, PMSW.

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	soP (= other examined assignment) according to §§ 26, 27 APO
Examination - length/format	<b>One</b> of the following formats: <ul style="list-style-type: none"> <li>seminar paper/research project</li> <li>portfolio assignment</li> </ul> The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a> .
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.



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Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Know the important concepts and instruments of entrepreneurship.</li> <li>• Identify and understand the determinants of successful entrepreneurship and apply them.</li> <li>• Find, analyse and evaluate business ideas in a systematic process.</li> <li>• Develop and evaluate alternative solutions to individual modules of a business plan and select the best possible solution alternative with regard to the success potential of the business idea.</li> <li>• Understand the interactions between the planning modules of a business plan and adjust the planning parameters accordingly.</li> <li>• Represent a convincing business idea for potential investors.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Finding ideas for an innovative and sustainable business idea and evaluating them with regard to their prospects of success.</li> <li>• Methods for the development of a business plan.</li> <li>• Linking elementary economic basic functions (e.g. planning, evaluating, analysing consequences, adjusting planning parameters) along the steps to create a business plan for a business idea in an iterative process.</li> <li>• Development of a business plan containing all essential components for the documentation and presentation of a business idea to potential investors: <ul style="list-style-type: none"> <li>○ Trigger, Background</li> <li>○ Product and service</li> <li>○ Customer benefits and USPs (Unique Selling Proposition)</li> <li>○ Entrepreneur team</li> <li>○ Market and competition</li> <li>○ Target groups, marketing and sales</li> <li>○ Business system and organization</li> <li>○ Timetable for implementation</li> <li>○ Opportunities and risks</li> <li>○ Financial plan and financing</li> </ul> </li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Abrams, R. (2014): <i>Successful Business Plan</i>, 6<sup>th</sup> ed., Redwood City, CA: Planning Shop.</li> <li>• Pinson, L. (2014): <i>Anatomy of a Business Plan</i>, 8<sup>th</sup> ed., Tustin, CA.: Out of Your Mind &amp; Into The Marketplace.</li> <li>• Schwetje, G. and Vaseghi, S. (2007): <i>The Business Plan</i>, Berlin: Springer.</li> </ul>

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## BCTH - Bachelorthesis

Module profile			
Modul-ID	BCTH		
Module name	Bachelorthesis		
Exam number	3817400		
Duration	1 semester		
Frequency	Winter and summer semester		
Credit hours (SWS)	0		
ECTS-Credits (CP)	10		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	300	0	300
Teaching format	-		
Language of instruction	English		

Organisation		
Responsible	Prof. Dr. Schmidt	
Lecturer(s)	Depends on the chosen topic.	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 7 <sup>th</sup> semester  Core module -	IBL 7 <sup>th</sup> semester  Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	According to § 11 SPO IBE: a) Successful completion of the supervised internship and the preparation and reflection of the internship b) At least 150 CPs	
Recommended prerequisites for the participation in the <b>module</b>	Successful passing of the module PMSW.	

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	Bachelor's Thesis
Examination - length/format	-
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

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### Learning outcomes, content and literature

Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>Independently work on a topic agreed between the supervisor and the candidate within the given timeframe according to scientific criteria.</li> <li>Work on a topic agreed between the supervisor and the candidate within the given timeframe according to scientific criteria.</li> <li>Understand the topic and derive the research question from it.</li> <li>Select suitable scientific methods and procedures and use them to find suitable solutions.</li> <li>Are able to interpret, evaluate and prepare the results in a suitable way and to communicate them according to the needs.</li> </ul>
Content	<p>Aims and contents of the bachelor thesis are either chosen by the student or proposed by the lecturer. These can be concrete practical topics or scientific topics in correlation with practical application.</p> <p>The topic must relate to "Business and Engineering" or "Logistics" and/or must relate to general or specific present questions and topics.</p>
Literature	<ul style="list-style-type: none"> <li>Easterby-Smith M.; Thorpe R.; Jackson P. and Jaspersen L. (2018): <i>Management and Business Research</i>, 6<sup>th</sup> Ed., Sage Publishing, Los Angeles.</li> <li>Minto, B. (2009): <i>The Pyramid Principle, Logic in Writing and Thinking</i>, 3<sup>rd</sup> ed., Prentice Hall, Upper Saddle.</li> <li>Balzert, H.; Schröder, M. and Schäfer, Chr. (2011): <i>Wissenschaftliches Arbeiten - Ethik, Inhalt &amp; Form wiss. Arbeiten, Handwerkszeug, Quellen, Projektmanagement, Präsentationen</i>, 2. Aufl., Herdecke, W3L Verlag.</li> </ul>

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## GENE - General Elective

Module profile			
Module ID	GENE		
Module name	General Elective		
Exam number	Depends on the chosen courses.		
Duration	1 semester		
Frequency	Winter and summer semester		
Credit hours (SWS)	4 Either two general electives ( <i>Allgemeinwissenschaftliche Wahlpflichtfächer</i> , AWPf) (2 x 2 teaching units/week) or one AWPf (1 x 4 teaching units/week) from the AWPf-catalogue of the Faculty of Applied Natural Sciences and Humanities (FANG).		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	SU (= seminar-like lecture); S (= seminar); Ü (= tutorial)		
Language of instruction	The respective language(s) will be laid down and published by the Faculty of Applied Natural Sciences and Humanities.		

Organisation		
Responsible	Dean of the Faculty of Applied Natural Sciences and Humanities	
Lecturer(s)	Lecturers of the Faculty of Applied Natural Sciences and Humanities and/or lecturers instructed by the Faculty.	
Applicability;	The module serves to develop interdisciplinary competences (" <i>studium generale</i> "); it is not closely related to any other module of the degree programme. It can be applied to all bachelor's programmes without blocking note. At the Faculty of Business and Engineering the module has to be taken in the following programmes:	
Semester according to SPO; Type of module; If applicable specialisation	IBE 7 <sup>th</sup> semester  General elective module -	IBL 7 <sup>th</sup> semester  General elective module -
Particular conditions for the participation in the <b>module</b> according to the SPO	Usually none; exceptions are defined and published by the Faculty of Applied Natural Sciences and Humanities.	
Recommended prerequisites for the participation in the <b>module</b>	Usually none; exceptions are defined and published by the Faculty of Applied Natural Sciences and Humanities.	

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Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	Every AWPf is completed by an examination; it's type will be laid down and published by the Faculty of Applied Natural Sciences and Humanities.
Examination - length/format	The duration of the examination(s) will be laid down and published by the Faculty of Applied Natural Sciences and Humanities in case of a written examination.
Language of examination	The language of the examination depends on the chosen AWPf. It will be laid down and published by the Faculty of Applied Natural Sciences and Humanities.
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>Subject-specific learning outcomes depend in each case on the chosen AWPf. Students</p> <ul style="list-style-type: none"> <li>• Will additionally acquire knowledge and skills outside their discipline that, however, may be important for their intended careers. as for example specialist knowledge of foreign languages, or knowledge in the fields of natural sciences and social sciences.</li> <li>• Will analyse a variety of problems.</li> <li>• Connect their subject-specific knowledge to that of other disciplines and thus get an interdisciplinary perspective.</li> <li>• transfer acquired knowledge to current training situation</li> <li>• Will have broadened their key competences and, if applicable, foreign language skills which both contribute to their character formation also in terms of interculturality.</li> <li>• Are aware of their personal, social, and ethical responsibility.</li> </ul>
Content	<p>FANG offers AWPfs from the areas of</p> <ul style="list-style-type: none"> <li>• Languages</li> <li>• Cultural Sciences</li> <li>• Natural Sciences and Technology</li> <li>• Politics, Law, Economics</li> <li>• Pedagogy, Psychology, Social Sciences</li> <li>• Soft Skills</li> <li>• Creativity and Art</li> </ul> <p>Contents that are already included or closely related to other module contents of the degree programme are excluded from the FANG catalogue. In the FANG catalogue, the respective classes are marked by a blocking note.</p> <p>The content of each AWPf is published on FANG's website.</p>
Literature	Depends in each case on the chosen AWPfs.

## Appendix 1: Catalogue of Core Electives in Engineering (E) 1/2/3/4

By completing the Core Electives in Engineering (ENG1/2/3/4), students acquire thorough knowledge in technical areas. Students can choose courses from the fields of mechanical engineering, electrical engineering (available from SS23) and mechatronics. Students may specialise in one technical field; to do so, they have to complete a certain combination of courses. Depending on the field, two courses are compulsory and two more can be chosen from a list. Possible courses are listed below.

Students who do not want to specialise become generalists and can combine four courses for Core Electives in Engineering independent from the field of engineering.

Mechanical Engineering	Electrical Engineering	Mechatronics
Compulsory courses for the respective specialisation		
<a href="#">SMME</a> Strength of materials and machine elements	EE01 tbd	<a href="#">CODT</a> Control and Drive Technology
<a href="#">MTPP</a> Manufacturing techniques and production processes	EE02 tbd	<a href="#">MTSY</a> Mechatronic Systems
Elective courses for the respective specialisation		
<a href="#">MAS2</a> Material Sciences 2	EE03 tbd	<a href="#">MAS2</a> Material Sciences 2
<a href="#">FUA</a> Fundamentals of automotive engineering	EE04 tbd	<a href="#">FUA</a> Fundamentals of automotive engineering
<a href="#">RTIC</a> Robotics	EE05 tbd	<a href="#">RTIC</a> Robotics
		<a href="#">ENDR</a> Energy and Drive

Additionally, the following courses from the German Bachelor's programme Wirtschaftsingenieurwesen (BWW) can be taken:

Maschinenbau (Mechanical Engineering)	Elektrotechnik (Electrical Engineering)	Mechatronik (Mechatronics)
Pflichtmodule der jeweiligen Vertiefung		
FEMA Festigkeitslehre und Maschinenelemente	GEST Grundlagen elektronischer Schaltungstechnik	SUAT Steuerungs- und Antriebstechnik
FEVE Fertigungstechniken und -verfahren	DIMT Digital- und Microcomputertechnik	MSYS Mechatronische Systeme
Wahlmodule der jeweiligen Vertiefung		
WET2 Werkstofftechnik II	MEDW Medizintechnik für Wirtschaftsingenieure	WET2 Werkstofftechnik II
GDFT Grundlagen der Fahrzeugtechnik	AUTT Automatisierungstechnik	GDFT Grundlagen der Fahrzeugtechnik
RTIK Robotik	EEAT Elektrische Energie- und Antriebstechnik	RTIK Robotik
		MEDW Medizintechnik für Wirtschaftsingenieure
		AUTT Automatisierungstechnik
		EEAT Elektrische Energie- und Antriebstechnik

For more information about these courses, please refer to the Module Handbook for the B.Eng. Programme Wirtschaftsingenieurwesen (BWW).

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## Specialisation Mechanical Engineering

### Compulsory Module 1: SMME - Strength of materials and machine elements

Module profile			
Module ID	SMME		
Module name	Strength of Materials and Machine Elements		
Exam number	3814110		
Duration	1 semester		
Frequency	Summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. Spielfeld
Lecturer(s)	Prof. Dr. Bunsen; Prof. Dr. Spielfeld
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> semester Core elective module Compulsory for Mechanical Engineering
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	MSDE and TMEC should be completed successfully.

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO <b>or</b> soP (= other examined assignment) according to §§ 26, 27 APO



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Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Describe the procedure for the strength calculation of components.</li> <li>• Dimension elements.</li> <li>• Name different construction elements (bearings, screws, axles and shafts).</li> <li>• Choose the right element for a specific problem.</li> <li>• Understand the operation of the different elements and apply the rules of the design of screw connections.</li> <li>• Describe how bearings work and apply their knowledge of bearing life calculation.</li> <li>• The students carry out dimensioning calculations on selected machine elements and provide strength proofs by acquiring specialized and methodical competencies in strength theory and machine elements.</li> <li>• Interpret technical drawings and documentation correctly.</li> <li>• Develop machine elements methodically.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Calculation of stresses (tension /compression, shear, bending, torsion)</li> <li>• Determination of stress states</li> <li>• Presentation of selected strength hypotheses</li> <li>• Performing a proof of strength on a selected machine element</li> <li>• Basic concepts of methodical development</li> <li>• Discussion of selected machine elements</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Callister, W. (2007): <i>Materials Science and Engineering</i>, 7<sup>th</sup> ed., New York: Wiley.</li> <li>• Gross, D.; Hauger, W.; Schröder, J.; Wall, W. and Bonet, J. (2018): <i>Engineering mechanics 2: mechanics of materials</i>, 2<sup>nd</sup> ed., Berlin: Springer.</li> </ul>

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## Compulsory Module 2: MTPP - Manufacturing techniques and production processes

Module profile			
Module ID	MTPP		
Module name	Manufacturing techniques and production processes		
Exam number	3814210		
Duration	1 semester		
Frequency	Summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. Tiesler
Lecturer(s)	Prof. Dr. Hofmann; Prof. Dr. Tiesler; Prof. Dr. Versch
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> semester Core elective module Compulsory for Mechanical Engineering
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO <b>or</b> soP (= other examined assignment) according to §§ 26, 27 APO
Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-</p>

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	Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a> .
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Use the technical terminology for the manufacturing processes according to DIN 8580 with an emphasis on machining, forming and joining technologies in a technical discussion.</li> <li>• Use the interactions between workpiece, process and system technology to evaluate concrete manufacturing processes.</li> <li>• Derive effects of external and internal influencing factors on the process result in the context of process improvements or new developments.</li> <li>• For a specific application and its design elements, select the most appropriate manufacturing process based on the advantages and disadvantages of the process.</li> <li>• Assess the use of a manufacturing process under given constraints, both in terms of technical applicability and the economic impact of the process.</li> <li>• Transfer the knowledge of components and semi-finished products presented in the lecture to new applications.</li> </ul>
Content	<p>Introduction to manufacturing technology</p> <ul style="list-style-type: none"> <li>• fundamentals of metal forming</li> <li>• basic concept of plasticity, strains and stresses, flow curve</li> <li>• selected metal forming processes (bulk and sheet metal forming, cold and hot) and their application, required machines and tools</li> <li>• Fundamentals of the welding process</li> <li>• System technology and processes of arc-, laser-, and gas welding</li> <li>• fundamentals of cutting</li> <li>• basic concept of cutting edge, chip formation, cutting forces and temperatures</li> <li>• cutting tool materials, tool wear and tool life behaviour</li> <li>• calculation of forces, material removal rate and required machine power for selected machining processes (e.g. turning, milling) considering their certain kinematics</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Klocke, F. (2013): <i>Manufacturing Processes 4: Forming</i> (RWTH ed.), Berlin: Springer.</li> <li>• Klocke, F. (2011): <i>Manufacturing Processes 1: Cutting</i> (RWTH ed.), Berlin: Springer.</li> <li>• Schuler GmbH (edit.): <i>Metal Forming Handbook</i>, 1<sup>st</sup> ed., Berlin: Springer.</li> <li>• Weman, K. (2012): <i>Welding processes handbook</i>, 2<sup>nd</sup> ed., Cambridge: Woodhead.</li> </ul>

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## Elective Module 1: MAS2 - Material Sciences 2

Module profile			
Module ID	MAS2		
Module name	Materials Science 2		
Exam number	3815101		
Duration	1 semester		
Frequency	Winter semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. Spielfeld
Lecturer(s)	Prof. Dr. J. Meyer; Prof. Dr. Spielfeld
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 5 <sup>th</sup> semester  Core elective module Applicable for Mechanical Engineering and/or Mechatronics
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	Successful passing of the modules MSDE and TEME.

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Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO <b>or</b> soP (= other examined assignment) according to §§ 26, 27 APO
Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Describe heat treatment techniques for steel.</li> <li>• Describe suitable heat treatment processes for a specific application.</li> <li>• Describe destructive and non-destructive material testing techniques.</li> <li>• Describe an appropriate testing technology to detect specific modes of material failures.</li> <li>• Describe the basics of casting technology for steel and cast iron.</li> <li>• Apply the specific techniques to design casted parts.</li> <li>• Apply the method of “Heuver Circles”.</li> <li>• Describe diverse non-ferrous materials and their properties.</li> <li>• Characterize manufacturing and testing techniques as well as basic methods of plastic component design in the field of engineering plastics.</li> <li>• Describe relevant properties and environmental issues of plastic materials and consider them for material selection and component design.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Ferrous materials</li> <li>• Mechanical materials testing</li> <li>• Nonferrous materials: Production and fields of application</li> <li>• Properties of plastic materials and their determination</li> <li>• Selection of plastic materials and design of plastic components</li> <li>• Manufacturing of plastic components</li> <li>• Material databases</li> <li>• Environmental issues of plastic materials and material cycle</li> </ul>

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Literature	<ul style="list-style-type: none"> <li>• Ashby, M.F. (2017): <i>Materials Selection in Mechanical Design</i>, 5<sup>th</sup> ed., Boston: Butterworth-Heinemann.</li> <li>• Berns, H. and Theisen, W. (2010): <i>Ferrous Materials - Steel and cast iron</i>, Berlin: Springer.</li> <li>• Callister, W.D. and Rethwisch, D.G. (2014): <i>Materials Science and Engineering</i>, 9<sup>th</sup> ed., Hoboken: Wiley.</li> <li>• Shah, V. (2007): <i>Handbook of plastics testing and failure analysis</i>, 3<sup>rd</sup> ed., Hoboken: Wiley.</li> <li>• Su, W. (2013): <i>Principles of Polymer Design and Synthesis</i>, Berlin: Springer.</li> </ul>
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## Elective Module 2: FUAЕ - Fundamentals of automotive engineering

Module profile			
Module ID	FUAЕ		
Module name	Fundamentals of automotive engineering		
Exam number	3815102		
Duration	1 semester		
Frequency	Winter semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. Felsner
Lecturer(s)	Prof. Dr. Felsner
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 5 <sup>th</sup> semester Core elective module Applicable for Mechanical Engineering and/or Mechatronics
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	-

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO <b>or</b> soP (= other examined assignment) according to §§ 26, 27 APO

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Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Describe the fundamental structure of vehicles, as well as of power trains and wheel suspensions.</li> <li>• Use the concept of longitudinal, lateral and vertical dynamics for investigations and calculations.</li> <li>• Do the basic design of vehicle components.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• driving resistance, power engines</li> <li>• driving performance and limits</li> <li>• Components of <ul style="list-style-type: none"> <li>○ power train</li> <li>○ brakes</li> <li>○ steering</li> <li>○ wheel suspension</li> </ul> </li> <li>• handling characteristics</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Barton, D. C. and Fieldhouse, J. D. (2018): <i>Automotive chassis engineering</i>, Cham: Springer International Publishing AG.</li> <li>• Fischer, R.; Küçükay, F.; Jürgens, G.; Najork, R. and Pollak, B. (2015): <i>The Automotive Transmission Book</i>, Cham Heidelberg New York Dordrecht London: Springer International Publishing Switzerland.</li> <li>• Heißing, B. and Ersoy, M. (Eds.) (2011): <i>Chassis Handbook: Fundamentals, Driving Dynamics, Components, Mechatronics, Perspectives</i>, Wiesbaden: Vieweg+Teubner Verlag.</li> </ul>



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### Elective Module 3: RTIC - Robotics

Module profile			
Module ID	RTIC		
Module name	Robotics		
Exam number	3815115		
Duration	1 semester		
Frequency	Winter semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. J. Meyer
Lecturer(s)	Prof. Dr. J. Meyer
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 5 <sup>th</sup> semester Core elective module Applicable for Mechanical Engineering and/or Mechatronics
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	-

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO <b>or</b> soP (= other examined assignment) according to §§ 26, 27 APO

Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

### Learning outcomes, content and literature

Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Describe design principles of robot kinematics and their components.</li> <li>• Differentiate between different types of robot kinematics and specify corresponding fields of application and application limits.</li> <li>• Apply the Denavit-Hartenberg convention for describing robot kinematics.</li> <li>• Specify the location of the end-effector as a function of the joint variables and vice versa.</li> <li>• Create and interpret simple robot programmes.</li> <li>• Specify application areas and application limits of human-robot collaboration.</li> </ul>
Content	<ul style="list-style-type: none"> <li>○ Design principles of robot kinematics</li> <li>○ Application areas of robots</li> <li>○ Kinematics <ul style="list-style-type: none"> <li>○ Forward manipulator kinematics</li> <li>○ Inverse manipulator kinematics</li> </ul> </li> <li>○ Denavit-Hartenberg parameters</li> <li>○ Trajectory planning</li> <li>○ Sensors</li> <li>○ End-effectors</li> <li>○ Robot programming</li> <li>○ Human-robot collaboration (HRC)</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Niku, S. (2010): <i>Introduction to Robotics</i>, Hoboken: John Wiley &amp; Sons.</li> <li>• Siciliano, B. and Khatib, O. (Hrsg.) (2016): <i>Springer Handbook of Robotics</i>, 2<sup>nd</sup> ed., Berlin: Springer.</li> </ul>

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## Specialisation Mechatronics

### Compulsory Module 1: CODT - Control and Drive Technology

Module profile			
Module ID	CODT		
Module name	Control and Drive Technology		
Exam number	3814130		
Duration	1 semester		
Frequency	Summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. A. Hofmann
Lecturer(s)	Prof. Dr. A. Hofmann; Prof. Dr. Versch
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> semester Core elective module Compulsory for Mechatronics
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	Successful passing of the modules MATB, MATA, TESI, EMSY.

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO <b>or</b> soP (= other examined assignment) according to §§ 26, 27 APO

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Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

### Learning outcomes, content and literature

Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Choose and apply manual and automated sensors and measuring systems.</li> <li>• Qualify and apply automated systems.</li> <li>• Apply methods and concepts of control and drive without faults.</li> <li>• Know the set-up and function of specific electrical power systems and controls, as well as fluid power systems.</li> <li>• Understand the correlations of specific components, modules and systems of control and drive technology.</li> </ul>
Content	<p><b>Element 1: Sensors and controls</b></p> <ul style="list-style-type: none"> <li>• Sensors and metrology systems</li> <li>• Control systems and programming methods</li> <li>• Basics of field bus systems</li> <li>• Operational behaviour of automated systems</li> </ul> <p><b>Element 2: Control and drive engineering</b></p> <ul style="list-style-type: none"> <li>• The students know the set-up and mode of operation of selected electric and fluid technological drive and control systems. The students know strengths and weaknesses of different solutions and can select the best drive system for different applications in factory automation and mobile applications. The students can verbally describe cause-effect relations of selected components, modules and systems of control and drive engineering.</li> <li>• The students know all the necessary equations to describe the systems, modules and components behaviour. They are able to design and to dimension a drive systems solution for a certain application based on calculations.</li> </ul>

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Literature	<ul style="list-style-type: none"> <li>• Beyerer, J. (2016): <i>Machine vision</i>, Berlin: Springer Verlag.</li> <li>• Fraden, J. (2016): <i>Handbook of modern sensors</i>, 5<sup>th</sup> ed., Springer International Publishing.</li> <li>• Kaftan, J. (2011): <i>PLC basic course with SIMATIC S7</i>, Würzburg: Vogel Verlag.</li> <li>• Kief, B. (2013): <i>CNC-Handbook</i>, New York: McGraw Hill.</li> <li>• Murrenhoff (2011): <i>Grundlagen der Fluidtechnik</i>, 6. Aufl., Shaker Verlag.</li> <li>• Roddeck (2006): <i>Einführung in die Mechatronik</i>, Teubner Verlag.</li> <li>• Sommer, S.: <i>Taschenbuch automatisierte Montage- und Prüfsysteme</i>, Hanser Verlag.</li> </ul>
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## Compulsory Module 2: MTSY - Mechatronical Systems

Module profile			
Module ID	MTSY		
Module name	Mechatronical Systems		
Exam number	3814230		
Duration	1 semester		
Frequency	Summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. Hirn
Lecturer(s)	Prof. Dr. Hirn
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> semester Core elective module Compulsory for Mechatronics
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	Successful passing of the modules TEME, EMSY.

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO <b>or</b> soP (= other examined assignment) according to §§ 26, 27 APO

Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

### Learning outcomes, content and literature

Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Understand the components, structure and functioning of mechatronic systems.</li> <li>• Recognize the advantage of the "mechatronic approach".</li> <li>• Create simulation models for dynamic systems.</li> <li>• Perform simulations with these models.</li> <li>• Analyze systems in the time, picture and frequency domain.</li> <li>• Compute responses of systems to input signals.</li> <li>• Design simple control circuits for mechatronic systems.</li> <li>• Analyze the stability and frequency response of control circuits.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Architecture of mechatronic systems</li> <li>• Design processes for mechatronic systems</li> <li>• DAE modeling (differential equations), balance equations and state variables</li> <li>• Simulation of models in Matlab and Simulink</li> <li>• Components of mechatronic systems</li> <li>• Structure of the standard control loop and application of the Laplace transform</li> <li>• Transfer function for system description</li> <li>• Properties of the basic elements (P, PT1, PT2 ...)</li> <li>• System responses and –stability</li> <li>• Frequency responses and the Bode plots</li> </ul>

Literature	<ul style="list-style-type: none"> <li>• Bode, H. (2010): <i>Systeme der Regelungstechnik mit Matlab und Simulink</i>, 2. Aufl., Oldenbourg-Verlag</li> <li>• Girod, B.; Rabenstein, R. und Stenger A. (2007): <i>Einführung in die Systemtheorie</i>, 4. Aufl., Berlin: Springer-Verlag.</li> <li>• Glöckler, M. (2018): <i>Simulation mechatronischer Systeme</i>, 2. Aufl., Berlin: Springer Verlag.</li> <li>• Isermann, R. (2008): <i>Mechatronische Systeme</i>, 2. Aufl., Berlin: Springer-Verlag.</li> <li>• Janschek, K. (2010): <i>Systementwurf mechatronischer Systeme: Methoden - Modelle - Konzepte</i>, Berlin: Springer-Verlag.</li> <li>• Roddeck, W. (2016): <i>Einführung in die Mechatronik</i>, 5. Aufl., Berlin: Springer-Verlag.</li> <li>• Information about literature in English will be provided in class.</li> </ul>
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### Elective Module 1: MAS2 - Material Sciences 2

Please see [Elective Module 1: MAS2 - Material Sciences 2](#)

### Elective Module 2: FUAЕ - Fundamentals of automotive engineering

Please see [Elective Module 2: FUAЕ - Fundamentals of automotive engineering](#)

### Elective Module 3: RTIC - Robotics

Please see [Elective Module 4: RTIC - Robotics](#)

### Elective Module 4: ENDR - Energy and Drive

Module profile			
Module ID	ENDR		
Module name	Energy and Drive		
Exam number	3815108		
Duration	1 semester		
Frequency	Winter and/or summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. Herranz Gracia
Lecturer(s)	Prof. Dr. Herranz Gracia
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 5 <sup>th</sup> semester Core elective module Applicable for Mechatronics
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	-

Examination	
Particular conditions for the participation in the examination according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO <b>or</b> soP (= other examined assignment) according to §§ 26, 27 APO

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Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

### Learning outcomes, content and literature

Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Value electric energy systems.</li> <li>• Compare different systems concerning efficiency and under an industrial management point of view.</li> <li>• Evaluate the requirements of operation processes and choose appropriate drives.</li> <li>• Understand similarly efficiency and industrial management aspects.</li> <li>• Apply the knowledge to simplified real-world problems.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Electric Energy</li> <li>• Polyphase AC circuits</li> <li>• Electric grid</li> <li>• Electricity storage (electrical, chemical, mechanical,...)</li> <li>• Power stations (coal, gas, hydroelectric and others)</li> <li>• Wind energy and wind turbines</li> <li>• Solar energy, solar-thermal and photovoltaic systems</li> <li>• Solar cells</li> <li>• Switch-mode power supplies and inverters</li> <li>• Energy management</li> <li>• Electric drives</li> <li>• Induction motors</li> <li>• Synchronous machines</li> <li>• DC machines</li> <li>• Working mechanisms and their characteristics</li> <li>• Equation of motion</li> <li>• Selecting a motor</li> </ul>

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Literature	<ul style="list-style-type: none"> <li>• Manwell, J.F.; McGowan, J.G. and Rogers, A.L. (2010): <i>Wind Energy Explained: Theory, Design and Application</i>, 2<sup>nd</sup> ed., Chichester: John Wiley and Sons.</li> <li>• Prasad, R. (2014): <i>Fundamentals of Electrical Engineering</i>, PHI Learning, Delhi.</li> <li>• Tiwari, J.P. (2011): <i>Basic Electrical Engineering</i>, 2<sup>nd</sup> ed., New Delhi: New Age International Publishers.</li> <li>• Weedy, B.M. and Cory, B.J. (1998): <i>Electric Power Systems</i>, 4<sup>th</sup> ed., Chichester: John Wiley and Sons.</li> <li>• Boxwell, M. (2014): <i>Solar Electricity Handbook - 2014 ed.: A Simple Practical Guide to Solar Energy - Designing and Installing Photovoltaic Solar Electric Systems</i>, Coventry: Greenstream Publishing.</li> </ul>
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## Appendix 2: Catalogue of Core Electives in Business (B) 1/2/3/4

By completing the Core Electives in Business, students acquire thorough knowledge in business-related areas. The offer includes courses from the subject areas of production, sales, controlling, purchasing and digital business. Students may specialise in one area; to do so, they have to complete a certain combination of courses. Depending on the field, two courses are compulsory and two more can be chosen from a list. Possible courses are listed below. Students who do not want to specialise become generalists and can combine four courses as Core Electives in Business independent from the subject area.

Production	Sales	Controlling	Purchasing	Digital Business
Compulsory courses for the respective specialisation (BUS1, BUS2 according to SPO dated 22 June 2022)				
<a href="#">LEPR</a> Lean Production and CIP	<a href="#">PB2B</a> Principles of B2B-Marketing and Sales	<a href="#">COME</a> Controlling and Managementreporting	<a href="#">STPU</a> Strategic Purchasing	<a href="#">CIDP</a> Current Issues in Digital Business Processes
<a href="#">FPER</a> Factory Planning and Ergonomics	<a href="#">AB2B</a> Applied B2B-Marketing and Sales	<a href="#">ACAC</a> Accounting in Accordance with IFRS	<a href="#">ADPU</a> Advanced Purchasing	<a href="#">BI1E</a> Business Intelligence I
Elective courses for the respective specialisation (BUS3, BUS4 according to SPO dated 22 June 2022)				
<a href="#">MMAN</a> Materials Management	<a href="#">INTM</a> International Marketing	<a href="#">COFS</a> Consolidated Financial Statements	<a href="#">MMAN</a> Materials Management	<a href="#">SAPE</a> Production-related Business Processes with SAP Software Solutions
<a href="#">INEN</a> Industrial Engineering	<a href="#">IMAR</a> International Market Research	<a href="#">GLFI</a> Global Financial Markets	<a href="#">INLO</a> International Logistics	<a href="#">ERPE</a> über vhb*: ERP Systems and Digital Transformation
<a href="#">MAFS</a> Material Flow Simulation	<a href="#">DMAE</a> Digital Marketing		<a href="#">SCMG</a> Supply Chain Management	<a href="#">BI2E</a> Business Intelligence II
<a href="#">SIXS</a> Process Optimization with Six Sigma			<a href="#">ERPE</a> via vhb*: ERP Systems and Digital Transformation	
<a href="#">COIN</a> Connected Industry			<a href="#">ENEC</a> Energy Economics	
<a href="#">MALA</a> Machine Learning				

\* vhb = Virtuelle Hochschule Bayern, Webseite: <https://www.vhb.org/>

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Additionally, the following courses from the German Bachelor's programme Wirtschaftsingenieurwesen (BWW) can be taken:

<b>Produktion (Production)</b>	<b>Vertrieb (Sales)</b>	<b>Controlling (Controlling)</b>	<b>Einkauf (Purchasing)</b>	<b>Digital Business (Digital Business)</b>
<b>"Pflichtmodule" der jeweiligen Vertiefung (WWP1, WWP2 gemäß SPO vom 22.06.2022)</b>				
POPT Produktionsoptimierung & KVP	B2B1 Theoretische Grundlagen von B2B-Marketing und -Vertrieb	COMA Controlling & Managementreporting	STE1 Strategischer Einkauf 1	APDG Aktuelle Problemstellungen in digitalen Geschäftsprozessen
FAPL Fabrikplanung & Ergonomie	B2B2 Anwendung von B2B-Marketing und -Vertrieb	IFRS Rechnungslegung nach IFRS	STE2 Strategischer Einkauf 2	BI1D Business Intelligence I
<b>"Wahlmodule" der jeweiligen Vertiefung (WWP3, WWP4 gemäß SPO vom 22.06.2022)</b>				
IENG Industrial Engineering	INTM Internationales Marketing	USTN Unternehmenssteuern	MWIR Materialwirtschaft	SAPD Produktionsnahe Geschäftsprozesse mit SAP Softwarelösungen
DFAB Digitale Fabrik	GFVH Gesprächsführung und Verhandlung	UNTR Unternehmensrecht	ITDS über vhb*: Internationale Transportlogistik & Distributionssysteme	ERPD über vhb*: ERP-Systeme in der digitalen Transformation
VNPR Vernetzte Produktion	INMF Internationale Marktforschung	KORL Konzernrechnungslegung	ERPD über vhb*: ERP Systeme und digitale Transformation	BI2D Business Intelligence II
MASI Materialflusssimulation	DMAD Digitales Marketing	GLFM Globale Finanzmärkte		
MWIR Materialwirtschaft		EEBDA über vhb*: Evidenzbasierte Entscheidungen auf der Grundlage von Big Data Analytics		

For more information about these courses, please refer to the Module Handbook for the B.Eng. Programme Wirtschaftsingenieurwesen (BWW).

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## Specialisation Production

### Compulsory Module 1: LEPR - Lean Production and CIP

Module profile			
Module ID	LEPR		
Module name	Lean Production and CIP		
Exam number	3815310		
Duration	1 semester		
Frequency	Winter and/or summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation		
Responsible	Prof. Dr. Bräutigam	
Lecturer(s)	Prof. Dr. Bräutigam; Prof. Dr. Engelmann; Prof. Dr. J. Schmitt	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester Core elective module Compulsory for Production	IBL 5 <sup>th</sup> /7 <sup>th</sup> semester Core elective module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-	
Recommended prerequisites for the participation in the <b>module</b>	-	

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO <b>or</b> soP (= other examined assignment) according to §§ 26, 27 APO

Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

### Learning outcomes, content and literature

Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Describe the individual elements, the relationships and the underlying philosophy of Lean Management (LM).</li> <li>• Explain the underlying philosophy of LM.</li> <li>• Select and apply the various methods and tools of LM depending on the individual case.</li> <li>• Recognize the links and differences with classical production control models.</li> <li>• Derive elements of Lean Management on their own and to compare different production systems.</li> <li>• Determine the requirements of the process participants (stakeholders).</li> <li>• Apply the taught methods and tools of LM in various application scenarios.</li> <li>• Reflect the obtained results in the team.</li> </ul>
Content	<p>Lean Management Methods and Tools</p> <ul style="list-style-type: none"> <li>• Kaizen</li> <li>• Value stream design</li> <li>• Levelling</li> <li>• 5S</li> <li>• Kanban</li> <li>• SMED</li> </ul> <p>Control of material and information flow</p> <ul style="list-style-type: none"> <li>• Push - Pull</li> <li>• Shop Floor Management Cycle</li> <li>• Visual Management</li> <li>• Basics SCM</li> </ul> <p>Examples for production systems in practice</p>

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Literature	<ul style="list-style-type: none"> <li>• Liker, J.K. (2004): <i>The Toyota Way – 14 Management Principles from the World's greatest manufacturer</i>, Tata McGraw.</li> <li>• Liker, J.K. and Meier, D.P. (2005): <i>The Toyota-Way Fieldbook</i>, McGrawHill.</li> <li>• Rother, M. (2009): <i>Learning to See: Toyota Kata</i>, McGraw Hill Professional.</li> </ul>
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## Compulsory Module 2: FPER - Factory Planning and Ergonomics

Module profile			
Module ID	FPER		
Module name	Factory Planning and Ergonomics		
Exam number	3815410		
Duration	1 semester		
Frequency	Winter and/or summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation		
Responsible	Prof. Dr. Deutschle	
Lecturer(s)	Prof. Dr. Bräutigam; Prof. Dr. Deutschle; Prof. Dr. Engelmann; Prof. Dr. J. Schmitt	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester  Core elective module Compulsory for Production	IBL 5 <sup>th</sup> /7 <sup>th</sup> semester  Core elective module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-	
Recommended prerequisites for the participation in the <b>module</b>	Successful completion of the module WWIG or ECSB.	

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO <b>or</b> soP (= other examined assignment) according to §§ 26, 27 APO

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Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

### Learning outcomes, content and literature

Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Explain the content and importance of the planning phases.</li> <li>• Design a suitable target system for the factory planning and to use it for the evaluation of planning variants.</li> <li>• Simplify, to depict, to evaluate and systematically redesign value streams.</li> <li>• Select suitable methods for layout planning and to design or optimize material flow optimized layouts.</li> <li>• Differentiate the terms work load, performance capacity and strain.</li> <li>• Design simple manual work systems using ergonomic standards.</li> <li>• Describe and evaluate basic environmental work conditions.</li> <li>• Carry out and interpret simple ergonomic risk assessments.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Systematic approach to factory planning</li> <li>• Design and use of target systems</li> <li>• Value-benefit-analysis</li> <li>• Selection criteria and selection of factory locations</li> <li>• Site master plan, building planning</li> <li>• Value stream analysis and value stream design</li> <li>• Streamlined factory layout planning: triangle grid method, permutation method</li> <li>• Ergonomics: basic definitions and terms</li> <li>• Human performance capability</li> <li>• Laws, standards and guidelines for operational safety and health</li> <li>• Human work work design, examples of industrial work place design (work place, tools, environment, organization)</li> <li>• Ergonomic risk assessment</li> </ul>

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Literature	<p>Current ed. of:</p> <ul style="list-style-type: none"> <li>• Erlach, K. (2013): <i>Value Stream Design - The way towards a lean factory</i>, Berlin, Heidelberg: Springer Verlag.</li> <li>• Freivalds, A. (2014): <i>Niebel's Methods, Standards, and Work Design</i>, 13<sup>th</sup> ed., McGraw Hill.</li> <li>• Rother, M. and Shook, J. (2002): <i>Learning to see</i>, Lean Enterprise Institute.</li> <li>• Stephens, M. P. and Meyers, F. E. (2010): <i>Manufacturing Facilities Design &amp; Material Handling</i>, 4<sup>th</sup> ed., New Jersey: Pearson Prentice Hall.</li> </ul>
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## Elective Module 1: INEN - Industrial Engineering

Module profile			
Module ID	INEN		
Module name	Industrial Engineering		
Exam number	3817201		
Duration	1 semester		
Frequency	Winter and/or summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation		
Responsible	Prof. Dr. Deutschle	
Lecturer(s)	Prof. Dr. Bräutigam; Prof. Dr. Deutschle; Prof. Dr. Engelmann; Prof. Dr. J. Schmitt	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester  Core elective module Applicable for Poduction	IBL 5 <sup>th</sup> /7 <sup>th</sup> semester  Core elective module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-	
Recommended prerequisites for the participation in the <b>module</b>	Successful completion of the modules WWIG or ECSB.	

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Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO <b>or</b> soP (= other examined assignment) according to §§ 26, 27 APO
Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Describe the term authority and competence for the role of the industrial engineer.</li> <li>• Select and apply methods for the collection, evaluation and application of operational data.</li> <li>• Describe, evaluate and suggest improvements for work systems by using operational data.</li> <li>• Differentiate process types and process times and to use them for the design of work systems.</li> <li>• Design standard work places respecting economic and human aspects of work.</li> <li>• Describe the importance of setup times and apply methods for their reduction.</li> <li>• Evaluate influencing factors for standard times and to create standard time modules.</li> <li>• Evaluate and select work systems from an economic standpoint.</li> </ul>

Content	<ul style="list-style-type: none"> <li>• Successful companies, human work and REFA</li> <li>• Social competencies of the REFA industrial engineer</li> <li>• REFA work system</li> <li>• Process-oriented organisation</li> <li>• Management of operational data</li> <li>• Task and work flow</li> <li>• Human work design</li> <li>• Work system design</li> <li>• Setup time</li> <li>• Creation of standard time modules</li> <li>• Predetermined time systems</li> <li>• Cost calculation with operational data</li> <li>• Basics of wage tariffs, job evaluation and performance evaluation</li> </ul> <p>The module is based on content of the "REFA Basic Training 2.0". REFA offers students the possibility to complete the course theory and to participate in additional courses and workshops with the goal to achieve the "REFA Basic Training 2.0" as an additional job qualification.</p>
Literature	<p>Current ed. of:</p> <ul style="list-style-type: none"> <li>• Crowson, R. (2006): <i>The Handbook of Manufacturing Engineering: Product Design and Factory Development</i>, 2<sup>nd</sup> ed., Boca Rayton: CRC Taylor &amp; Francis.</li> <li>• Freivalds, B. and Niebel, W. (2014): <i>Niebel's Methods, Standards, and Work Design</i>, 13<sup>th</sup> ed., New York: McGraw Hill.</li> <li>• REFA (2014): <i>REFA Basic Training 2.0</i>, REFA Bundesverband.</li> <li>• Stephens, M.P. and Meyers, F.E. (2013): <i>Manufacturing Facilities Design &amp; Material Handling</i>, 5<sup>th</sup> ed., New Jersey: Pearson Prentice Hall.</li> </ul>

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## Elective Module 2: MAFS - Material Flow Simulation

Modul profile			
Module ID	MAFS		
Module name	Material Flow Simulation		
Exam number	3817230		
Duration	1 Semester		
Frequency	Winter and/or summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation		
Responsible	Prof. Dr. Schwindl	
Lecturer(s)	Ms. Ullerich	
Applicability; Semesters according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester  Core elective module Applicable for Poduction	IBL 5 <sup>th</sup> /7 <sup>th</sup> semester  Core elective module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-	
Recommended prerequisites for the participation in the <b>module</b>	Successful passing of the module MFPS.	

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO <b>or</b> soP (= other examined assignment) according to §§ 26, 27 APO

Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Create complex simulation models to answer problems by themselves.</li> <li>• Know and apply the necessary fundamental functions as well as the different objects of Plant Simulation, program methods, and use distribution functions to constitute material flow data correctly.</li> <li>• Have a compact overview of the discrete event simulation and solve complex logistic and technical production questioning.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Principles of Plant Simulation:</li> <li>• Surface</li> <li>• Objects</li> <li>• Methods and the programming language SIM TALK</li> <li>• Creation of simple simulations models</li> <li>• Distribution functions and statistical tools</li> <li>• Creation of extensive simulation models</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Bangsow, S. (2011): <i>Manufacturing Simulation with Plant Simulation and SimTalk</i>, latest ed., Berlin: Springer.</li> <li>• Bangsow, S.: <i>Use Cases of Discrete Event Simulation</i>, latest ed., Berlin: Springer.</li> </ul>



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### Elective Module 3: MMAN - Materials Management

Module profile			
Module ID	MMAN		
Module name	Materials Management		
Exam number	3817201		
Duration	1 semester		
Frequency	Winter and/or summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation		
Responsible	Prof. Dr. Bräutigam	
Lecturer(s)	Prof. Dr. Bräutigam; Prof. Dr. Engelmann	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester  Core elective module Applicable for Production and/or Purchasing	IBL 5 <sup>th</sup> /7 <sup>th</sup> semester  Core elective module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-	
Recommended prerequisites for the participation in the <b>module</b>	-	

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO <b>or</b> soP (= other examined assignment) according to §§ 26, 27 APO

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Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

### Learning outcomes, content and literature

Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Explain the role of materials management in a changing environment as a cost driver.</li> <li>• Derive and evaluate materials management as a tool for managing a wide range of goods and services for a variety of stakeholders. <ul style="list-style-type: none"> <li>○ Apply the elements of materials management in theory and practice.</li> <li>○ Distinguish and apply different methods for demand, capacity and resource planning.</li> <li>○ Create requirements plans for vendors.</li> <li>○ Plan production, to recognize the context of the added value and to derive measures for optimisation.</li> </ul> </li> <li>• Understand all activities in the material flow from supplier to customer and describe strengths and weaknesses.</li> <li>• Analyse the potential of materials management and to derive improvements.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Overview of supply chain and production systems</li> <li>• Discussion of the systematic of Materials Management</li> <li>• Introduction to Materials Management and Production Planning Systems</li> <li>• Master Planning (MPS &amp; SIOP) Scheduling</li> <li>• Material Requirement and Manufacturing Resource Planning (MRP &amp; MRP II)</li> <li>• Capacity Management</li> <li>• Production Activity Control</li> <li>• Purchasing (if required)</li> <li>• Forecasting</li> <li>• Inventory Fundamentals</li> <li>• Order Quantities and Optimum Lot Sizing (EOQ)</li> <li>• Independent Demand Ordering Systems and Production Management</li> <li>• Physical Inventory and Warehouse Management</li> </ul>
Literature	Arnold, J.R.T.; Chapman, S.N. and Clive, L.M.: <i>Introduction to Materials Management</i> , latest ed.; Prentice Hall.

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## Elective Module 4: SIXS - Process Optimization with Six Sigma

Module profile			
Module-ID	SIXS		
Module name	Process Optimization with Six Sigma		
Exam number	3817237		
Duration	1 semester		
Frequency	Winter and/or summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation		
Responsible	Prof. Dr. Schwindl	
Lecturer(s)	Prof. Dr. Schwindl	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester  Core elective module Applicable for Poduction	IBL 5 <sup>th</sup> /7 <sup>th</sup> semester  Core elective module -
Particular conditions for the participation in the module according to the SPO	-	
Recommended prerequisites for the participation in the module	Successful completion of the modules STAT/STAC and PRQS /PRQA.	

Examination	
Particular conditions for the participation in the examination according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO <b>or</b> soP (= other examined assignment) according to §§ 26, 27 APO

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Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Plan the concept based systematic procedure given in the context of Six Sigma project initiatives in industrial daily business on the basis of real data and case studies.</li> <li>• Develop robust processes according the zero-defect-philosophy.</li> <li>• Design, plan, develop and define process parameters and activities to improve productive processes permanently and consistently in both their technical and economic efficiency.</li> <li>• Apply the DMAIC cycle on quantitative data-driven analysing and planning methods.</li> <li>• Plan and execute a case based Six Sigma project to improve a production process based on data analysis methods.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Six Sigma specific project management: DMAIC structure, SWOT analysis, probability and regression based project management</li> <li>• Sigma Estimation, Sample Size Determination, Statistical Quality Methods</li> <li>• Define Phase: Project Charter, Affinity diagram, Kano's Model, DPU and DPMO</li> <li>• Measure Phase: VoC, VoP, Sources of Variation, Probability Models, Capability Analysis</li> <li>• Analyze Phase: Process Mapping, Parameter Estimation, Testing of Hypothesis, Goodness-of-Fit Tests, Regression Analysis, Non-linear Regression, Analysis of Variance, Root Cause Analysis, Analyze Checklists, Relevance for Managers</li> <li>• Improve Phase: Balanced Scorecard (BSC), Design of Experiments, Process Mapping for Improvements, Simulation Techniques, Process Implementation and Validation, Improve Check Sheets, etc.</li> <li>• Control Phase: Statistical Process Control, Poka Yoke, Process Dashboards, etc.</li> <li>• Sigma Level Estimation, Continuous Improvement (Deming and Crosby's Quality Philosophy, data-driven)</li> </ul> <p>The students are given the opportunity to obtain a real Six Sigma green belt certificate after they passed the examination successfully.</p>

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Literature	<ul style="list-style-type: none"> <li>• Cano, E.L.; Moguerza, J.M. and Redchuk, A. (2012): <i>Six Sigma with R</i>, Springer, New York.</li> <li>• Carroll, C.T. (2013): <i>Six Sigma for Powerful Improvement</i>, Taylor &amp; Fancis, New York.</li> <li>• Evans, J.R. and Lindsay, W.M. (2015): <i>An Introduction to Six Sigma &amp; Process Improvement</i>, 2<sup>nd</sup> ed., Stamford.</li> </ul>
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## Elective Module 5: COIN - Connected Industry

Module profile			
Module ID	COIN		
Module name	Connected Industry		
Exam number according to degree programme	3817238		
Duration	1 semester		
Frequency	Winter and/or summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation		
Responsible	Prof. Dr. Engelmann	
Lecturer(s)	Prof. Dr. Engelmann; Prof. Dr. J. Schmitt	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester  Core elective module Applicable for Poduction	IBL 5 <sup>th</sup> /7 <sup>th</sup> semester  Core elective module -
Particular conditions for the participation in the module according to the SPO	-	
Recommended prerequisites for the participation in the module	-	

Examination	
Particular conditions for the participation in the examination according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO or soP (= other examined assignment) according to §§ 26, 27 APO

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Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP one of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Identify the most important network devices and understand how they work.</li> <li>• Establish communication between networked technical devices.</li> <li>• Recognize unique features and characteristics of smart sensors.</li> <li>• Transfer data storage tasks into database concepts and to design databases.</li> <li>• Distinguish and evaluate Internet communication concepts.</li> <li>• Integrate Internet services in their own projects.</li> <li>• Abstract and implement processes and simple visualizations of practical tasks.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Terms and concepts of industry 4.0 at a glance</li> <li>• Introduction to network technology</li> <li>• Introduction to machine-machine communication</li> <li>• Characteristics and selection of smart sensors</li> <li>• Database design</li> <li>• Internet technologies and services</li> <li>• Graphical programming with Node-RED</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Alasdair G. (2016): <i>Industry 4.0 - The Industrial Internet of Things</i>, Apress.</li> <li>• Meier, A. and Kaufmann, M. (2016): <i>SQL- &amp; NoSQL-Databases</i>, Springer.</li> <li>• Rayes, A. and Salam, S. (2016): <i>Internet of Things: From Hype to Reality: The Road to Digitization</i>, Springer.</li> <li>• Robertazzi, T.: <i>Introduction to Computer Networking</i>, Springer International Publishing.</li> </ul>

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## Elective Module 6: MALA - Machine Learning

Module profile			
Module ID	MALA		
Module name	Machine Learning		
Exam number	3817250		
Duration	1 semester		
Frequency	Winter and/or summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation		
Responsible	Prof. Dr. Schmitt	
Lecturer(s)	Prof. Dr. Engelmann; Prof. Dr. Schmitt	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester  Core elective module Applicable for Poduction	IBL 5 <sup>th</sup> /7 <sup>th</sup> semester  Core elective module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-	
Recommended prerequisites for the participation in the <b>module</b>	Basics in Phyton and/or Matlab programming	

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	soP (= other examined assignment) according to §§ 26, 27 APO
Examination - length/format	One of the following formats: <ul style="list-style-type: none"> <li>• Seminar paper/research project</li> <li>• Portfolio assignment</li> </ul> The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the eLearning course " <a href="#">Studien- und Prüfungsangelegenheiten/study and examination matters</a> ".
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.



Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Distinguish between core techniques of Machine Learning e.g. supervised and unsupervised Machine Learning.</li> <li>• Capture a context and its relevant data, functions and documents to derive an abstract model.</li> <li>• Structure data driven issues to prepare big (input) data to feed Machine Learning algorithms.</li> <li>• Use methods of Machine Learning.</li> <li>• Solve application-oriented challenges by Machine Learning techniques.</li> <li>• Implement Machine Learning models and algorithms to certain development environment (Matlab and/or Python).</li> <li>• Evaluate own Machine Learning based models by specific indicators.</li> <li>• Explain the most important functions of Machine Learning models, their related characteristics, and how they effect on the model output.</li> <li>• Interpret the results of the models.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Machine Learning in Industry 4.0 and logistics context</li> <li>• Principle methods of classification and regression learning</li> <li>• Development environments for Machine Learning</li> <li>• CRISP-DM method</li> <li>• Data preparation methods</li> <li>• Application and evaluation of Machine Learning models</li> <li>• Discovering real (industrial) data by Machine Learning techniques</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Disruptor, T., and Vermeulen, A. F. (2020): <i>Industrial Machine Learning</i>, New York: Apress.</li> <li>• Forsyth, D. (2019): <i>Applied Machine Learning</i>, Basel: Springer International Publishing.</li> <li>• Kelleher, J. D.; Mac Namee, B. and D'arcy, A. (2020): <i>Fundamentals of machine learning for predictive data analytics: algorithms, worked examples, and case studies</i>, Cambridge: MIT press.</li> <li>• Meier, A. and Kaufmann, M. (2016): <i>SQL- &amp; NoSQL-Databases</i>, Berlin: Springer.</li> <li>• Rebala, G.; Ravi, A. and Churiwala, S. (2019): <i>An introduction to machine learning</i>, Berlin: Springer.</li> </ul>

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## Specialisation Sales

### Compulsory Module 1: PB2B - Principles of B2B-Marketing

Module profile			
Module ID	PB2B		
Module name	Principles of B2B Marketing and Sales		
Exam number	3835330		
Duration	1 semester		
Frequency	Winter and/or summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. Sponholz
Lecturer(s)	Prof. Dr. Huttelmaier
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester Core elective module Compulsory for Sales
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	Complete successfully ECS2.

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO <b>or</b> soP (= other examined assignment) according to §§ 26, 27 APO

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Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Describe essential models in B2B Marketing and Sales.</li> <li>• Compare H2H Marketing with B2B Marketing.</li> <li>• Evaluate H2H Marketing as an integral approach based on insights from design thinking, service dominant logic and increasing digitalization (Bangalore Model).</li> <li>• Discover the increasing importance of trust and customer experience in building and expanding business relationships.</li> <li>• Show the core process "Marketing and Sales".</li> <li>• Assess the practicability of different methods and instruments.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Introduction to B2B Marketing and Sales</li> <li>• Tasks and responsibilities in B2B Marketing and Sales</li> <li>• Core Process "Marketing and Sales" in the B2B Environment</li> <li>• Design of a B2B marketing concept</li> <li>• Transaction type approach according to Backhaus/Voeth Bangalore Model of H2H Marketing</li> <li>• Models to explain organisational procurement behaviour</li> <li>• H2H Marketing as Mindset</li> <li>• H2H Marketing as an iterative process through the business model canvas</li> <li>• H2H Marketing as management approach with brand, reputation and customer experience management</li> <li>• Wicked Problems as source of sustainable innovations</li> <li>• Generation of Human Insights</li> <li>• Design of Value Propositions</li> <li>• Market planning: procedures, methods and instruments</li> <li>• Customer planning: procedures, methods and instruments</li> <li>• Basics of sales management and controlling</li> <li>• New customer acquisition and business initiation</li> <li>• Value Selling /Insight Selling</li> <li>• Customer Relationship Management</li> <li>• Drawing up of requirements and functional specifications (quotation phase)</li> </ul>

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Literature	<ul style="list-style-type: none"> <li>• Backhaus, K. and Voeth, M. (2014): <i>Industriegütermarketing</i>, München: Vahlen.</li> <li>• Behle, C. and Hofe vom, R.: <i>Handbuch Außendienst</i>, München: Vahlen.</li> <li>• Brennan, R. (2013): <i>Business-to-business marketing</i>, 2<sup>nd</sup> ed., Los Angeles: SAGE.</li> <li>• Futrell, C.M. (2014): <i>Fundamentals of selling</i>, 13<sup>th</sup> ed., Irwin, New York: McGraw-Hill.</li> <li>• Gaubinger, K.; Rabl, M.; Swan, S. and Werani, T. (2015): <i>Innovation and Product Management</i>, Berlin Heidelberg: Springer.</li> <li>• Hall, S. (2017): <i>Innovative B2B marketing</i>, New York: Kogan Page.</li> <li>• Kotler, P.; Pförtsch, W.A. and Michi, I. (2006): <i>B2B brand management</i>, Berlin: Springer.</li> <li>• Pförtsch, W. and Sponholz, U. (2019): <i>Das neue Marketing-Mindset. Management, Methoden und Prozesse für ein Marketing von Mensch zu Mensch</i>, Wiesbaden: Springer.</li> <li>• Winkelmann, P. (2012): <i>Vertriebskonzeption und Vertriebssteuerung: Die Instrumente des integrierten Kundenmanagements - CRM</i>, 5. Aufl., München: Vahlen.</li> <li>• Zimmerman, A. and Blythe, J. (2017): <i>Business to Business Marketing Management: A Global Perspective</i>, Milton: Routledge.</li> </ul>
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## Compulsory Module 2: AB2B - Applied B2B-Marketing

Module profile			
Module ID	AB2B		
Module name	Applied B2B-Marketing and Sales		
Number	3835430		
Duration	1 semester		
Frequency	Winter and/or summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. Sponholz
Lecturer(s)	Prof. Dr. Huttelmaier
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester  Core elective module Compulsory for Sales
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	Complete successfully ECS2. Participation in module PB2B.

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO <b>or</b> soP (= other examined assignment) according to §§ 26, 27 APO

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Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Work out selected components of a marketing concept for various B2B companies.</li> <li>• Create a market plan.</li> <li>• Create a customer plan.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Development of business-type specific marketing concepts</li> <li>• Sales planning and control on the basis of an EXCEL database</li> <li>• Territory planning with Regiograph</li> <li>• Implementation of tour planning</li> <li>• Conducting a needs analysis</li> <li>• Creation of an understanding protocol (MOU)</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Backhaus, K. and Voeth, M. (2014): <i>Industriegütermarketing</i>, München: Vahlen.</li> <li>• Behle, C. and Hofe vom, R.: <i>Handbuch Außendienst</i>, München: Vahlen.</li> <li>• Brennan, R. (2013): <i>Business-to-business marketing</i>, 2<sup>nd</sup> ed., Los Angeles: SAGE.</li> <li>• Futrell, C.M. (2014): <i>Fundamentals of selling</i>, 13<sup>th</sup> ed., Irwin, New York: McGraw-Hill.</li> <li>• Gaubinger, K.; Rabl, M.; Swan, S. and Werani, T. (2015): <i>Innovation and Product Management</i>, Berlin Heidelberg: Springer.</li> <li>• Hall, S. (2017): <i>Innovative B2B marketing</i>, New York: Kogan Page.</li> <li>• Kotler, P.; Pförtsch, W.A. and Michi, I. (2006): <i>B2B brand management</i>, Berlin: Springer.</li> <li>• Pförtsch, W. and Sponholz, U. (2019): <i>Das neue Marketing-Mindset. Management, Methoden und Prozesse für ein Marketing von Mensch zu Mensch</i>, Wiesbaden: Springer.</li> <li>• Winkelmann, P. (2012): <i>Vertriebskonzeption und Vertriebssteuerung: Die Instrumente des integrierten Kundenmanagements - CRM</i>, 5. Aufl., München: Vahlen.</li> <li>• Zimmerman, A. and Blythe, J. (2017): <i>Business to Business Marketing Management: A Global Perspective</i>, Milton: Routledge.</li> </ul>

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## Elective Module 1: INTM - International Marketing

Module profile			
Module ID	INTM		
Module name	International Marketing		
Exam number	3817207		
Duration	1 semester		
Frequency	Winter and/or summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. Schulz
Lecturer(s)	Prof. Dr. Schulz; Prof. Dr. Sponholz
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester Core elective module Applicable for Sales
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	The student has successfully participated in either ECS2 or WWI2.

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO <b>or</b> soP (= other examined assignment) according to §§ 26, 27 APO

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Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Identify elementary structures and processes of the international trade and market development.</li> <li>• Interpret factual, cultural knowledge to understand dynamics on foreign markets.</li> <li>• Conceptualize a preliminary marketing plan.</li> <li>• Understand global marketing processes.</li> <li>• Differentiate between the international and global marketing approach.</li> <li>• Compare the international characteristics as well as the intercultural challenges of the global marketing.</li> <li>• Apply the marketing mindset to the intercultural context.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Cultural analysis and understanding</li> <li>• Political and legal environment</li> <li>• International market audit and competitive analysis</li> <li>• Preliminary marketing plan</li> <li>• Researching international markets</li> <li>• Evaluation of international markets</li> <li>• International strategies</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Ghauri, P. N. and Cateora, P. (2014): <i>International Marketing</i>, 4<sup>th</sup> ed., McGraw-Hill Education, Berkshire.</li> <li>• Usunier, J.-C. and Lee, J. A. (2013): <i>Marketing across Cultures</i>, Pearson.</li> </ul>



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## Elective Module 2: IMAR - International Market Research

Module profile			
Module ID	IMAR		
Module name	International Market Research		
Exam number	3817248		
Duration	1 semester		
Frequency	Winter and/or summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. Sponholz
Lecturer(s)	Mr. Krüger; Prof. Dr. Sponholz
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester  Core elective module Elective for Sales
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	-

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO <b>or</b> soP (= other examined assignment) according to §§ 26, 27 APO

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Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Complete successfully the examination.

### Learning outcomes, content and literature

Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Dedicate suitable market research methods to different market research requirements.</li> <li>• Describe different national habits regarding the reply to questionnaires.</li> <li>• Find suitable international data sources.</li> <li>• Design questionnaires (formulation and layout) which ensure satisfying response rates.</li> <li>• Elaborate possible answers in a way to ensure high data consistency in an international environment.</li> <li>• Create representative probes in an international environment.</li> <li>• Establish database structures for international competitive intelligence.</li> <li>• Conceive an international market survey.</li> <li>• Implement an international market survey.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Overview of possible market research methods</li> <li>• National practices of selected countries</li> <li>• Suitable and reliable data sources</li> <li>• Research- and questionnaire design</li> <li>• Theory of sampling and its application</li> <li>• Major differences between national and international surveys</li> <li>• Importance of data consistency and its realisation</li> <li>• International competitive intelligence</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Craig, C. S. and Douglas, S. P. (2005): <i>International Marketing Research</i>, 3<sup>rd</sup> ed., Chichester.</li> <li>• Craig, C. S. and Douglas, S. P. (2001): <i>Conducting international marketing research in the twenty-first century</i>, International Marketing Review, 18(1), 80–90.</li> <li>• Individual documents that are distributed during the lecture.</li> </ul>

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### Elective Module 3: DMAE - Digital Marketing

Module profile			
Module ID	DMAE		
Module name	Digital Marketing		
Exam number	3817262		
Duration	1 semester		
Frequency	Winter and/or summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. Huttelmaier
Lecturer(s)	Prof. Dr. Huttelmaier
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester Core elective module Applicable for Sales
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	The student has successfully participated in ECS2 and PB2B.

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO <b>or</b> soP (= other examined assignment) according to §§ 26, 27 APO

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Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

### Learning outcomes, content and literature

Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Describe and critically discuss the impact of digitalization on marketing and sales.</li> <li>• Explain the theoretical foundations, essential terms, concepts and tools of digital marketing.</li> <li>• Analyze the changing information and purchasing behaviour of B2B decision-makers.</li> <li>• Plan and implement digital marketing campaigns and measure their performance.</li> <li>• Describe the digital marketing channels which are relevant for B2B companies, to discuss them critically and to apply them to real-world cases.</li> <li>• Identify, describe and apply use cases for artificial intelligence in marketing automation.</li> <li>• Apply content of this module in state-of-the-art software tools to practical problems.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• The impact of digitalization on marketing and sales - strategy, marketing mix, operations.</li> <li>• Foundations of digital marketing.</li> <li>• Planning digital marketing campaigns.</li> <li>• Customer Journey Mapping.</li> <li>• Digital marketing channels and instruments - fundamentals, applications, tools and performance measurement: e.g. corporate website design; search engine marketing (SEO / SEA); influencer marketing; social media marketing; B2B e-commerce; affiliate marketing; programmatic advertising; marketing automation and email marketing.</li> <li>• Application of artificial intelligence in marketing.</li> </ul>

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Literature	<ul style="list-style-type: none"> <li>• Artun, Ö. And Levin, D. (2015): <i>Predictive Marketing: Easy Ways Every Marketer Can Use Customer Analytics and Big Data</i>, NJ, USA: John Wiley &amp; Sons, Inc, Hoboken.</li> <li>• Chaffey, D. and Ellis-Chadwick, F. (2019): <i>Digital marketing</i>, 7<sup>th</sup> ed., Harlow, England ; New York: Pearson.</li> <li>• Chaffey, D. and Smith, P. (2017): <i>Digital Marketing Excellence: Planning, Optimizing and Integrating Online Marketing</i>, Taylor &amp; Francis.</li> <li>• Kingsnorth, S. (2019): <i>Digital Marketing Strategy: An Integrated Approach to Online Marketing</i>, 2<sup>nd</sup> ed., Kogan Page.</li> <li>• Miller, M. (2012): <i>B2B Digital Marketing: Using the Web to Market Directly to Businesses</i>, Que Biz-Tech, Pearson Education.</li> <li>• Waite, K. and Vega, R.P. (2018): <i>The Essentials of Digital Marketing, Global Management Series</i>, Goodfellow Publishers, Limited.</li> </ul>
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## Specialisation Controlling

### Compulsory Module 1: Controlling and Management Reporting

Module profile			
Module ID	COME		
Module name	Controlling and Management Reporting		
Exam number	3815340		
Duration	1 semester		
Frequency of the offer	Summer Semester		
Semester hours per week (SWS)	4		
ECTS credits (CP)	5		
Workload	Total Workload	Share of attendance time	Share of self-study
respective hours	150	60	90
Course type(s)	Seminar		
Teaching language	English		

Organisation	
Responsible	Prof. Dr. Ankenbrand
Lecturer	Prof. Dr. Ankenbrand; Prof. Dr. Kraus
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester Core elective module Compulsory for Controlling
Obligatory requirements according to SPO for participation in the <b>module</b>	-
Recommended requirements for participation in the <b>module</b>	Successful completion of the module Accounting.

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO

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Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Examination language	English
Condition for the award of credit points	Successful completion of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module the learner should be able:</p> <ul style="list-style-type: none"> <li>• to define and describe basic as well as specific terms and connections of controlling in theory and practice,</li> <li>• to use and interpret methods of cost and activity accounting, which are needed in the daily work of the industrial engineer</li> <li>• to apply key figures and key figure systems and to question them critically,</li> <li>• to solve and contrast practical cases from later professional life</li> <li>• to classify and evaluate instruments of strategic, tactical and operational planning and control accordingly</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Traditional controlling methods and value-based management methods</li> <li>• Controlling tasks based on practical case studies</li> <li>• Selective key figures of controlling as well as key figure systems like DuPont System and value driver hierarchies</li> <li>• Controlling-specific functions of a spreadsheet</li> <li>• Reporting of the results to the management including the appropriate preparation</li> <li>• Diverse instruments of strategic, tactical and operational planning and control</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Friedl, G.; Hofmann, C. and Burkhard, P. (2017): <i>Cost accounting - a decision-oriented introduction</i>, 3<sup>rd</sup> ed., Verlag Franz Vahlen.</li> <li>• Küpper, H.-U. and Friedl, G. et al. (2013) <i>Controlling: Concept, tasks, instruments</i>, 6<sup>th</sup> ed., Schäffer-Poeschel.</li> <li>• Weber, J. and Schäffer, U. (2014): <i>Introduction to controlling, exercises and case studies</i>, 2<sup>nd</sup> ed., Schäffer-Poeschel.</li> </ul>

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## Compulsory Module 2: Accounting in accordance with IFRS

Module profile			
Module ID	ACAC		
Module name	Accounting in accordance with IFRS		
Exam number	3815440		
Duration	1 semester		
Frequency of the offer	Summer semester		
Semester hours per week (SWS)	4		
ECTS credits (CP)	5		
Workload	Total Workload	Share of attendance time	Share of self-study
respective hours	150	60	90
Course type(s)	Seminar		
Teaching language	English		

Organisation	
Responsible	Prof. Dr. Kraus
Lecturer	Prof. Dr. Kraus
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester  Core elective module Compulsory for Controlling
Obligatory requirements according to SPO for participation in the <b>module</b>	-
Recommended requirements for participation in the <b>module</b>	Successful completion of the module Accounting.

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO



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Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Examination language	English
Prerequisite for the award of credit points	Successful completion of the examination.

### Learning outcomes, content and literature

Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Know the basics of corporate accounting according to the International Financial Reporting Standards (IFRS).</li> <li>• Explain the reasons for the internationalisation of accounting.</li> <li>• Discuss the framework principles.</li> <li>• Apply the regulations to specific accounting issues and can critically assess problems.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Institutional framework for accounting according to IFRS</li> <li>• Principles of accounting according to IFRS <ul style="list-style-type: none"> <li>○ Principles of the approach</li> <li>○ Basis of the evaluation</li> <li>○ Recognition of items in the balance sheet and income statement</li> </ul> </li> <li>• Accounting for business transactions <ul style="list-style-type: none"> <li>○ Intangible assets</li> <li>○ Tangible fixed assets</li> <li>○ Leasing</li> <li>○ Inventories and long-term construction contracts</li> <li>○ Financial instruments</li> <li>○ Equity</li> <li>○ Reserves</li> <li>○ Deferred taxes</li> </ul> </li> <li>• Complementary instruments <ul style="list-style-type: none"> <li>○ Statement of Changes in Equity</li> <li>○ Cash Flow Statement</li> <li>○ Segment reporting</li> </ul> </li> </ul>
Literature	<p>Basic literature (in the current edition):</p> <ul style="list-style-type: none"> <li>• Buchholz, R. (2018): <i>International Accounting: The essential regulations according to IFRS and HGB - with tasks and solutions</i>, 14<sup>th</sup> ed., Berlin, Erich Schmidt Verlag.</li> <li>• Coenenberg, A.-G.; Haller, A. and Schultze, W. (2018): <i>Jahresabschluss und Jahresabschlussanalyse: Business management, commercial, tax and international principles - HGB, IAS/IFRS, US-GAAP, DRS</i>, 25<sup>th</sup> ed., Stuttgart, Schäffer-Poeschel Verlag.</li> </ul>

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## Elective Module 1: Consolidated Financial Statements

Module profile			
Module ID	COFS		
Module name	Consolidated Financial Statements		
Exam number	3817210		
Duration	1 semester		
Frequency of the offer	Winter Semester		
Semester hours per week (SWS)	4		
ECTS credits (CP)	5		
Workload	Total Workload	Share of attendance time	Share of self-study
respective hours	150	60	90
Course type(s)	Seminar		
Teaching language	English		

Organisation	
Responsible	Prof. Dr. Kraus
Lecturer	Prof. Dr. Ankenbrand; Prof. Dr. Kraus
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester  Core elective module Applicable for Controlling
Obligatory requirements according to SPO for participation in the <b>module</b>	-
Recommended requirements for participation in the <b>module</b>	Passed the exam in Accounting.

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO

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Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Examination language	English
Condition for the award of credit points	Successful completion of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Explain and justify the necessity of preparing consolidated financial statements.</li> <li>• Be familiar with essential theoretical concepts of group accounting, especially consolidation, according to HGB and IFRS.</li> <li>• Apply these to specific cases and discuss the results and differences obtained.</li> <li>• Recognise issues from these areas in an interdisciplinary way and know how to classify them.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Necessity and significance of consolidated financial statements</li> <li>• Basic and principles</li> <li>• Duty to prepare financial statements and scope of consolidation</li> <li>• Preparation of the consolidated financial statements (from HB I to HB II) and its components</li> <li>• Capital consolidation</li> <li>• Debt consolidation</li> <li>• Elimination of intercompany profits</li> <li>• Consolidation of the income statement</li> <li>• Final consolidation</li> <li>• Deferred taxes in the consolidated financial statements</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Coenenberg, A.-G./Haller, A./Schultze, W. (2018): Annual financial statements and analysis of annual financial statements: Business management, commercial, tax and international principles - HGB, IAS/IFRS, US-GAAP, DRS, 25th edition, Stuttgart, Schäffer-Poeschel Verlag.</li> <li>• Baetge, J./Kirsch, H.-J./Thiele, S. (2017): Consolidated balance sheets, 12th edition, Düsseldorf, IDW Verlag GmbH.</li> </ul>

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## Elective Module 2: GLFI - Global Financial Markets

Module profile			
Module ID	GLFI		
Module name	Global Financial Markets		
Exam number	3817218		
Duration	1 semester		
Frequency of the offer	Winter Semester		
Semester hours per week (SWS)	4		
ECTS credits (CP)	5		
Workload	Total Workload	Share of attendance time	Share of self-study
respective hours	150	60	90
Course type(s)	Seminar		
Teaching language	English		

Organisation	
Module responsible person(s)	Prof. Dr. Ankenbrand
Lecturer	Prof. Dr. Ankenbrand; Prof. Dr. Kraus
Applicability; Study semester according to SPO; Type of module; If necessary, specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester Core elective module Applicable for Controlling
Obligatory requirements according to SPO for participation in the <b>module</b>	-
Recommended requirements for participation in the <b>module</b>	Passed the exam in Accounting.

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	soP (= other examined assignment) according to §§ 26, 27 APO

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Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Examination language	English
Prerequisite for the award of credit points	Successful completion of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module the learner should be able:</p> <ul style="list-style-type: none"> <li>• to identify global financial markets and their sub-markets and describe their functions and tasks,</li> <li>• to list actors in the global financial markets and to assign and explain their motives and tasks,</li> <li>• to name concrete financial instruments that are necessary in the everyday professional life of an industrial engineer, to differentiate them from each other and to evaluate their possible applications on the basis of practical examples,</li> <li>• to describe and explain risk hedging instruments and evaluate their meaningful use</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Importance and classification of global financial markets</li> <li>• Financial Instruments, such as bonds, equities, hybrid forms, structured products and derivatives</li> <li>• Players in global financial markets</li> <li>• Stock exchanges and other trading places</li> <li>• Foreign exchange market</li> <li>• Risk hedging</li> <li>• Behavioral finance</li> </ul> <p>Within the framework of an excursion to a financial market place (e.g. Frankfurt am Main), actors and markets are to be visited on site and concrete insights into the practice of global financial markets are to be provided.</p>
Literature	<ul style="list-style-type: none"> <li>• Madura, J. / Fox, R. (2017) International Financial Management, fourth edition, New York: Cengage Learning.</li> <li>• Etzold, V./Ramge, T. (2014) Equity Storytelling, Berlin: Springer.</li> </ul>

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## Specialisation Purchasing

### Compulsory Module 1: STPU - Strategic Purchasing

Module profile			
Module ID	STPU		
Module name	Strategic Purchasing		
Exam number	3815350		
Duration	1 semester		
Frequency	Winter semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	SU (= seminar-like lecture), S (= seminar)		
Language of instruction	English		

Organisation			
Responsible	Prof. Dr. Machholz		
Lecturer(s)	Prof. Dr. Machholz		
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester  Core elective module Compulsory for Purchasing	BLO* 5 <sup>th</sup> semester  Core module -	IBL 5 <sup>th</sup> semester  Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-		
Recommended prerequisites for the participation in the <b>module</b>	BLO* and IBL*: Successful passing of the modules OPMG, BPLO. IBL **: Successful passing of the modules OPME, ILOP.		

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination)
Examination - length/format	90 minutes
Language of examination	<ul style="list-style-type: none"> <li>BLO*: Deutsch oder Englisch nach Wahl der/des Studierenden (German or English - student's choice)</li> <li>IBE, IBL: English</li> </ul>
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Describe, interpret and determine the value-driving role of today's procurement.</li> <li>• Understand the traditional roles, processes and organizational forms of procurement.</li> <li>• Put into a position to analyse, design and improve current purchasing portfolios, processes and organizations.</li> <li>• Apply state-of-the-art know-how and technologies (e.g. AI, RPA, bots,...).</li> <li>• Increase purchasing's business, social and environmental impact.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Introduction &amp; overview, business impact &amp; recent development of the purchasing function within the last decades</li> <li>• Kraljic's procurement matrix and tools vs. Purchasing Chessboard, comparison of similarities &amp; differences of these 2 portfolio approaches</li> <li>• Procurement processes and organization models, SCOR Model</li> <li>• Performance Measurements &amp; relevant KPIs for purchasing</li> <li>• Contracts (specifics, critical factors), negotiations and communication models (von Thun, transaction analysis, DISG, NLP, Harvard concept)</li> <li>• Global sourcing, risks &amp; benefits, cultural differences, ethical &amp; environmental aspects</li> <li>• Supplier selection, assessment, and strategic development incl. many different industry examples</li> <li>• Category management</li> <li>• Non traditional categories</li> <li>• Risk management</li> <li>• Green sourcing, sustainability, consumption of resources</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Arnold, U. (1997): <i>Beschaffungsmanagement</i>, Stuttgart: Schäffer-Poeschel.</li> <li>• Hug, W. and Weber, J. (2011): <i>Wertetreiber Einkauf</i>, Weinheim: Wiley.</li> <li>• Levi, D.; Kaminsky, P. and Levi, E. (2008): <i>Designing &amp; Managing the Supply Chain</i>, 3<sup>rd</sup> ed., New York : McGraw Hill.</li> <li>• Kerkhoff, G. (2010): <i>Einkaufsagenda 2020</i>; Weinheim: Wiley VCH.</li> <li>• Mentzer, J. T. (2009): <i>Supply Chain Management</i>, New Delhi : Response Books.</li> </ul>

\* Concerning students who started their studies until 30<sup>th</sup> September 2022.

\*\* Concerning students who start their studies on 1 October 2022 or later.

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## Compulsory Module 2: ADPU - Advanced Purchasing

Module profile			
Module ID	ADPU		
Module name	Advanced Purchasing		
Exam number	3825450		
Duration	1 semester		
Frequency	Winter and/or summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation		
Responsible	Prof. Dr. Machholz	
Lecturer(s)	Prof. Dr. Machholz	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester  Core elective module Compulsory for Purchasing	IBL 5 <sup>th</sup> /7 <sup>th</sup> semester  Core elective module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-	
Recommended prerequisites for the participation in the <b>module</b>	Successful passing of the module STPU.	

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO <b>or</b> soP (= other examined assignment) according to §§ 26, 27 APO



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Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

### Learning outcomes, content and literature

Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Describe, analyse and use modern tools for global purchasing.</li> <li>• Gain profound understanding about state-of-the art e-procurement tools, processes and systems.</li> <li>• Learn to analyse portfolios, processes and organizational forms of procurement departments.</li> <li>• Be enabled to identify weaknesses and threats.</li> <li>• Propose optimized solutions for global companies/blue chips, as well as for small and medium enterprises (SMEs).</li> <li>• Gain specific insights regarding new tools (AI, game theory, social buying) and smart contracts (obsolescence mgmt.).</li> <li>• Be qualified for a new, technology driven business and process environment (IoT, Industry 4.0).</li> <li>• Learn about future job opportunities in procurement and their required skills sets.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Kraljic Matrix – product portfolios/views</li> <li>• Purchasing chessboard: What happens at level 2 and 3?, detailed tools &amp; many more examples for these (level 1) topics, Seek joint advantage with suppliers, Change nature of demand, Increase competition among suppliers, Manage spend</li> <li>• E-Procurement (B2B, B2C, Catalogue systems/Amazon-like buying)</li> <li>• P- 2-P (procure to pay) Processes</li> <li>• Game theory in procurement- what is this and where is it used?</li> <li>• Organizational forms of procurement: lead buyer organization vs. category management vs. shared services vs. 3rd party service providers</li> <li>• Procurement 4.0: Processes, Automation + Systems (e.g. Pool4Tool, Risk Methods, Orpheus spend cube), Artificial Intelligence/Cognitive Systems (e.g. IBM Watson), Future roles of CPOs/strategic and operational purchasing, Young Professionals /required skills &amp; development opportunities in procurement, 3D printing and its pot. impacts on manufacturing in low costs countries</li> </ul>

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Literature	<ul style="list-style-type: none"> <li>• Spiller, P.; Reinecke, N.; Ungerman, D. and Teixeira, H. (2014): Procurement 20/20- Supply Entrepreneurship in a changing world, Hoboken /NJ: Wiley.</li> <li>• Kraljic, P.: Purchasing Must Become Supply Management - Harvard Business Review 61 (5) p. 109-117, 1983, Boston: HBR.</li> <li>• Schuh, C.; Kromoser, R.; Strohmer, M. and Perez, A. (2017): Triplat – The purchasing chessboard, 3<sup>rd</sup> ed., Berlin, Heidelberg: Springer Verlag (3<sup>rd</sup> ed. 2017).</li> <li>• Kaufmann, L.; Ehrgott, M. and Reimann, F. (2013): Selected cases in Supply Management, Berlin : EMP Science ed., 1<sup>st</sup> ed..</li> <li>• Machek, F.; Möhrstädt, D.G. and Schmielek, J. (2012): Social buying: Revolution im Einkauf, Köln:Rainer Machek Verlag.</li> <li>• Building a workforce for the future, Harvard Business Review Oct. 2016, p. 49-63, Boston:HBR.</li> <li>• Brynjolfsson, E. (<i>MIT</i>) and McAfee, A. (<i>MIT</i>) (2014): The 2<sup>nd</sup> machine Age, New York, London : W.W Norton &amp; Company Inc.</li> </ul>
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## Elective Module 1: MMAN - Materials Management

Please see [Elective Module 3: MMAN - Materials Management](#)

## Elective Module 2: INLO - International Logistics

Module profile			
Module ID	INLO		
Module name	International Logistics		
Exam number	3915300		
Duration	1 semester		
Frequency	Winter semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	SU (=seminar-like lecture), S (= seminar)		
Language of instruction	English		

Organisation			
Responsible	Prof. Dr. Schmidt		
Lecturer(s)	Prof. Dr. Gampl; Prof. Dr. Schmidt		
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester  Core elective module Compulsory for Purchasing	BLO 5 <sup>th</sup> semester  Core module -	IBL 5 <sup>th</sup> semester  Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-		
Recommended prerequisites for the participation in the <b>module</b>	BLO/IBL: Successful passing of the modules TMFO and SCMG.		

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO
Examination - length/format	90 minutes The concrete length of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a> .

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Language of examination	<ul style="list-style-type: none"> <li>BLO: Deutsch oder Englisch nach Wahl der/des Studierenden (German or English - student's choice)</li> <li>IBE/IBL: English</li> </ul>
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>Explain the main drivers of global trade and their impact on transport and logistics activities.</li> <li>Identify possible service areas and tasks for international logistics service providers in different countries.</li> <li>Explain the managerial challenges and examples of solutions in international land transportation resp. the operation of inter-modal SCs between rail, road and sea.</li> <li>Illustrate the latest trends in maritime and container shipping and discuss the micro-economics of container shipping influencing the market competition.</li> <li>Explain the international air-cargo-chain with its players, trends, organisations, business models and competition.</li> <li>Describe the main challenges in international supply chain management and undermine the arguments by applying game theory approaches.</li> <li>Illustrate and analyse product flows in existing international supply chains graphically.</li> <li>Explain what E-Commerce is and describe important developments in the last years and respective reasons.</li> <li>Describe what green logistics and sustainability is and which standards can be used to "measure" the performance.</li> </ul>
Content	<ul style="list-style-type: none"> <li>Global trade and its impact on transport and logistics</li> <li>World Logistics Performance Index and possible service areas of international logistics service providers</li> <li>Managerial Challenges in international land transportation</li> <li>International Maritime and Container Shipping</li> <li>Characterization of the air cargo industry and and air freight shipping</li> <li>Challenges of international Supply Chain Management</li> <li>Analysis of product flows in international supply chains</li> <li>E-Commerce</li> <li>Green Logistics and Sustainability</li> </ul>
Literature	<ul style="list-style-type: none"> <li>Branch, A. (2009): <i>Global Supply Chain Management and International Logistics</i>, Oxon: Routledge.</li> <li>Branch, A. (2007): <i>Elements of Shipping</i>, 8<sup>th</sup> ed., Oxon: Routledge.</li> <li>Coyle J.; Novack, R. and Gibson, B. (2015): <i>Transportation. A Global Supply Chain Perspective</i>, 8<sup>th</sup> ed., Boston: Cengage Learning.</li> <li>Hill, C. W. L (2013): <i>International Business - Competing in the Global Marketplace</i>, 9<sup>th</sup> ed., New York: McGraw-Hill. (p. 518f: Coca Cola case study).</li> <li>Manners-Bell, J. (2017): <i>Introduction to Global Logistics. Delivering the Goods</i>, 2<sup>nd</sup> ed. London: Kogan Page.</li> </ul>

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	<ul style="list-style-type: none"> <li>Rodrigue, J.P.; Comtois, C. and Slack, B. (2006): <i>The Geography of Transport Systems</i>, 2<sup>nd</sup> ed., Oxon: Routledge.</li> <li>Wensveen, J. G. (2011): <i>Air Transportation. A Management Perspective</i>, 7<sup>th</sup> ed., Farnham: Ashgate.</li> </ul>
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### Elective Module 3: SCMG - Supply Chain Management

Module profile			
Module ID	SCMG		
Module name	Supply Chain Management		
Exam number	3817249		
Duration	1 semester		
Frequency	Summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	SU (= seminar-like lecture), S (= seminar)		
Language of instruction	English		

Organisation			
Responsible	Prof. Dr. Gampl		
Lecturer(s)	Prof. Dr. Gampl; Prof. Dr. Machholz		
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester  Core elective module Applicable for Purchasing	BLO 4 <sup>th</sup> semester  Core module -	IBL 4 <sup>th</sup> semester  Core module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-		
Recommended prerequisites for the participation in the <b>module</b>	BLO and IBL: Successful passing of the modules OPMG, TMFO, BPLO.		

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination)
Examination - length/format	90 minutes
Language of examination	<ul style="list-style-type: none"> <li>BLO: Deutsch oder Englisch nach Wahl der/des Studierenden (German or English - student's choice)</li> <li>IBE, IBL: English</li> </ul>
Condition for the award of credit points	Successful passing of the examination.

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Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Explain which activities are summarised by the term Supply Chain Management (SCM), how SCM has developed over the last decades and list recent challenges of SCM.</li> <li>• Explain different SCM strategies depending on product, industry and environment and apply these strategies to new cases.</li> <li>• State what cooperation models between suppliers and customers can exist also with focus on 3PLs (Third Party Logistics Providers).</li> <li>• Analyse and interpret recent developments on the 3PL market.</li> <li>• Explain why reaching high supply chain visibility is so difficult and list features of SCM software.</li> <li>• Explain measures to increase Supply Chain Security and give reasons why Risk Management for the whole Supply Chain is difficult to reach.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Definitions of SCM and development of SCM over time</li> <li>• Supply Chain strategies according to product, industry and environment (e.g. postponement, responsiveness, Triple A)</li> <li>• Concepts for collaboration within the supply chain linking together suppliers, manufacturers, logistic service providers, and customers</li> <li>• Information flow in Supply Chains with emphasis on supply chain visibility</li> <li>• Supply Chain Security and Risk Management</li> <li>• Culture and Human Resource Management as important aspects of successful Supply Chain Management</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Chopra, S. and Meindl, P. (2015): <i>Supply Chain Management</i>, 6<sup>th</sup> ed. (Global), Harlow: Pearson Education.</li> <li>• Fisher, M. L.: <i>What is the Right Supply Chain for your Product?</i> Harvard Business Review, March-April 1997, p. 1-10.</li> <li>• Simichi Levi, D.; Kaminsky, P. and Simichi Levi, E. (2009): <i>Designing and Managing the Supply Chain: Concepts, Strategies and Case Studies</i>, 3<sup>rd</sup> ed., Boston: Irwin/McGraw-Hill.</li> <li>• Stadtler, H.; Kilger, C. and Mayr, H. (2015): <i>Supply Chain Management and Advanced Planning</i>, 5<sup>th</sup> ed., Berlin: Springer Verlag.</li> <li>• Werner, H. (2013): <i>Supply Chain Management - Grundlagen, Strategien, Instrumente und Controlling</i>, 5. Aufl., Gabler Verlag.</li> </ul>

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## Elective Module 4: ERPE- ERP Systems and Digital Transformation

Module profile			
Module ID	ERPE		
Module name	ERP systems and digital transformation		
Exam number	3817245		
Duration	1 semester		
Frequency	Winter and summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60 (virtual in VHB course)	90
Teaching format	S (= Seminar) This module is provided via the virtual university of Bavaria [VHB]		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. Dobhan
Lecturer(s)	Prof. Dr. Dobhan; Prof. Dr. Knobloch; Mr. Senner
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester  Core elective module Applicable for Purchasing and/or Digital Business
Particular conditions for the participation in the module according to the SPO	-
Recommended prerequisites for the participation in the module	-

Examination	
Particular conditions for the participation in the examination according to the SPO appendix	-
Examination - type	soP (= other examined assignment) according to §§ 26, 27 APO
Examination - length/format	Seminar paper/research Project
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.



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### Learning outcomes, content and literature

Learning outcomes	<p>After successfully completing the module, the learner should be able to</p> <ul style="list-style-type: none"> <li>• Identify main characteristics and functionalities of ERP systems and to compare specific ERP systems with each other.</li> <li>• Recognize the integration impact of ERP systems (on business processes) and their architecture.</li> <li>• Assign digital actors to operational tasks in a target-oriented way.</li> <li>• Describe the potential of mobile ERP applications (Mobile ERP).</li> <li>• Describe a basic architecture for the integration of sensor data into an ERP system in the context of the Internet of Things and to implement it exemplarily.</li> <li>• Know and apply the methods of data extraction and data evaluation in the ERP context for business intelligence software.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• ERP systems as elements of a company's IT environment</li> <li>• Model-based assignment of digital actors to activities of a business process</li> <li>• Integration types and architectures of ERP systems</li> <li>• Use of ERP systems as digital actors</li> <li>• Architecture and potentials of mobile applications in the ERP context (Mobile ERP)</li> <li>• Architecture for integration of sensor data in ERP systems (IoT)</li> <li>• software-based possibilities for the extraction of business data from ERP systems</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Kurbel, K. (2013): <i>Enterprise Resource Planning and Supply Chain Management</i>, Berlin: Springer, DOI: <a href="https://doi.org/10.1007/978-3-642-31573-2">https://doi.org/10.1007/978-3-642-31573-2</a></li> <li>• Laudon, K. C. and Laudon, J.P. (2018): <i>Management Information Systems</i>, 15<sup>th</sup> ed., Harlow: Pearson Education Limited.</li> <li>• Leon, A. (2014): <i>Enterprise resource planning</i>, 3<sup>rd</sup> ed., Chennai: McGraw-Hill Education.</li> <li>• Omar, K. and Gómez, J. M. (2017): <i>An investigation of the proliferation of mobile ERP apps and their usability</i>, in: Information and Communication Systems (ICICS) 2017, IEEE, pp. 352-357, DOI: <a href="https://doi.org/10.1109/IACS.2017.7921997">https://doi.org/10.1109/IACS.2017.7921997</a>.</li> <li>• Serpanos, D. and Wolf, M. (2018): <i>Internet-of-Things (IoT) Systems: Architectures, Algorithms, Methodologies</i>, Cham: Springer International Publishing AG, DOI: <a href="https://doi.org/10.1007/978-3-319-69715-4">https://doi.org/10.1007/978-3-319-69715-4</a>.</li> <li>• Sumner, M. (2013): <i>Enterprise resource planning</i>, Harlow: Pearson Education Limited.</li> </ul>

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## Elective Module 5: ENEC - Energy Economics

Module profile			
Modul ID	ENEC		
Module name	Energy Economics		
Exam number	3817294		
Duration	1 semester		
Frequency	Winter semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	SU (= seminar-like lecture); S (= seminar)		
Language of instruction	English		

Organisation		
Responsible	Prof. Dr. Scheller	
Lecturer(s)	Prof. Dr. Scheller	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester Core elective module Applicable for purchasing	IBL 5 <sup>th</sup> /7 <sup>th</sup> semester Core elective module -
Particular conditions for the participation in the module according to the SPO	-	
Recommended prerequisites for the participation in the module		

Examination	
Particular conditions for the participation in the examination according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO or soP (= other examined assignment) according to §§ 26, 27 APO

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Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP one of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>Upon successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Distinguish commercial fleet fuel or energy source types concerning costs, emissions, and efficiencies.</li> <li>• Explain operational factors for selecting an adequate fuelling strategy for different kinds of freight transport.</li> <li>• Recognize the link between the energy consumption of commercial transport and energy economics.</li> <li>• Understand basic concepts of economic theory such as demand and supply and price formation in markets.</li> <li>• Compare the wholesale market prices of electricity, liquid fuels, or gaseous fuels with retail prices.</li> <li>• Evaluate opportunities and challenges of fleet electrification in the logistics industry from a business perspective.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Overview of energy sources and fuels for freight transport.</li> <li>• Factors of fuel use and challenges of different fuels.</li> <li>• Principles of energy management and economics.</li> <li>• Management of energy/ fuel demand and costs.</li> <li>• Basics of energy demand, supply, markets and prices.</li> <li>• Fundamentals of electricity markets.</li> <li>• Fundamentals of liquid and gaseous fuel markets.</li> <li>• Components of wholesale vs. retail fuel/ energy prices.</li> <li>• Impacts of high and volatile energy prices on logistics.</li> <li>• Trends regarding carbon neutral logistics and green fuels.</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Bhattacharyya, S. C. (2019): <i>Energy economics: concepts, issues, markets and governance</i>, Springer Nature.</li> <li>• Rodrigue, J. P. (2020): <i>The geography of transport systems</i>, Routledge.</li> <li>• Zweifel, P.; Praktijnjo, A. and Erdmann, G. (2017): <i>Energy economics: theory and applications</i>, Springer.</li> </ul>

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## Specialisation Digital Business

### Compulsory Module 1: CIDP - Current Issues in Digital Business Processes

Module profile			
Module ID	CIDP		
Module name	Current Issues in Digital Business Processes		
Exam number	3835360		
Duration	1 semester		
Frequency	Winter and/or summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. Dobhan
Lecturer(s)	Prof. Dr. Dobhan; Prof. Dr. Knobloch; Mr. Senner
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester Core elective module Compulsory for Digital Business
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	-

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO <b>or</b> soP (= other examined assignment) according to §§ 26, 27 APO

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Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

### Learning outcomes, content and literature

Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Transfer common problem-solving approaches of digital business to new situations.</li> <li>• Analyze processes in the business context in a target-oriented way.</li> <li>• Identify potentials for improvement through automation in business processes.</li> <li>• Modify real business processes in a target-oriented way.</li> <li>• Describe problem solving procedures systematically.</li> <li>• Give profound reasons for the selection of problem-solving methods.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Fundamentals, structure, and reasons of current business problems in the field of digital business.</li> <li>• Fundamentals of problem-related software for digital business</li> <li>• Fundamentals of problem-related solution methods in digital business</li> <li>• Structure and contents of IT documentations</li> <li>• Methods and approaches for as-is analysis of current business realities</li> <li>• Methods and approaches for the description of software programs</li> <li>• Methods and approaches for describing and realizing the target state of business processes</li> <li>• Methods and approaches for implementation planning as part of IT projects</li> <li>• Methods and approaches for the evaluation of problem solutions in digital business</li> </ul>

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Literature	<ul style="list-style-type: none"> <li>• Bardhan D.; Baumgartl, A.; Choi, N.-S.; Dudgeon, M.; Lahiri, A.; Meijerink, B. and Worsley-Tonks, A. (2019): <i>SAP S/4HANA: An Introduction</i>, edition 3.0, Bosten (MA): Rheinwerk Publishing.</li> <li>• Chaffey, D. (2015): <i>Digital Business and E-Commerce Management: Strategy, Implementation and Practice</i>, 6. Aufl., Harlow: Pearson Education Limited.</li> <li>• Correia, N. and Nayak, A. (2015): <i>Internet of things with SAP HANA</i>, Pontinho: CreateSpace.</li> <li>• Kerzner, H.: <i>Project Management</i>, 12<sup>th</sup> ed., Hoboken: Jon Wiley &amp; Sons.</li> <li>• Kurbel, K. (2013): <i>Enterprise Resource Planning and Supply Chain Management</i>, Berlin: Springer, DOI: <a href="https://doi.org/10.1007/978-3-642-31573-2">https://doi.org/10.1007/978-3-642-31573-2</a>.</li> <li>• Laudon, K. C. and Laudon, J.P. (2018): <i>Management Information Systems</i>, 15<sup>th</sup> ed., Harlow: Pearson Education Limited.</li> <li>• Erasmus, P.; Rao, V. V.; Sinha, A. and Wadawadigi, G. (2019): <i>SAP Leonardo: An Introduction to the Intelligent Enterprise</i>, Bosten (MA): Rheinwerk Publishing.</li> <li>• Urbach, N. and Röglinger, M. (2019) (ed.): <i>Digitalization Cases: How Organizations Rethink Their Business for the Digital Age</i>, Cham: Springer International, DOI: <a href="https://doi.org/10.1007/978-3-319-95273-4">https://doi.org/10.1007/978-3-319-95273-4</a>.</li> </ul>
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## Compulsory Module 2: BI1E - Business Intelligence I

Module profile			
Module ID	BI1E		
Module name	Business Intelligence I		
Exam number	3835460		
Duration	1 semester		
Frequency	Winter and/or summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. Knobloch
Lecturer(s)	Prof. Dr. Knobloch
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester  Core elective module Compulsory for Digital Business
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO <b>or</b> soP (= other examined assignment) according to §§ 26, 27 APO

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Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

### Learning outcomes, content and literature

Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Define, describe and classify Business Intelligence systems and their components.</li> <li>• Assess the suitability of BI systems architectures and tools for specific problem situations as well as to plan and implement their deployment.</li> <li>• Identify and explain requirements for information supplies in business, develop analytical applications and promote their deployment and use.</li> <li>• Extract, integrate and transform structured business data from transactional systems and store them in analytical database systems, and select appropriate methods, techniques, and processes for these purposes.</li> <li>• Apply data modelling methods.</li> <li>• Design and develop business reporting systems.</li> <li>• Analyse data by utilising statistical and analytical techniques and make the findings available to support business decisions.</li> </ul>
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Content	<ul style="list-style-type: none"> <li>• Motivation and concept of Business Intelligence;</li> <li>• Platforms, systems, and processing models for transforming, storing, and analysing structured data;</li> <li>• Functional and architectural models of Business Intelligence systems and tools, organised by the following layers: <ul style="list-style-type: none"> <li>◦ <i>Data acquisition layer</i>: Tasks and techniques of the ETL process for extracting, transforming and loading data into analytical database systems;</li> <li>◦ <i>Data storage layer</i>: Foundations and implementations of analytical database systems, data warehouses, data marts and operational data stores, multi-dimensional data structures and associated data modelling methods;</li> <li>◦ <i>Data access layer</i>: Concepts and tools for accessing, presenting, and interpreting information for decision support, esp. SQL queries, reporting, dashboards and visual analytics;</li> <li>◦ <i>Analytical application layer</i>: Concepts and tools for analysing data using data mining techniques;</li> </ul> </li> <li>• Procedures and practices for planning, developing, deploying and operating Business Intelligence systems; data governance, privacy, data protection, and data security.</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Golfarelli, M. and Rizzi, S. (2009): <i>Data Warehouse Design – Modern Principles and Methodologies</i>, New York: McGraw-Hill.</li> <li>• Kimball, R.; Ross, M.; Thornthwaite, W.; Mundy, J. and Becker, B. (2008): <i>The Data Warehouse Lifecycle Toolkit – Practical Techniques for Building Data Warehouse and Business Intelligence Systems</i>, 2<sup>nd</sup> ed., Indianapolis: Wiley Publishing.</li> <li>• Sharda, R.; Delen, D. and Turban, E. (2014): <i>Business Intelligence – A Managerial Perspective on Analytics</i>, 3<sup>rd</sup> ed., Harlow: Pearson Education.</li> <li>• Sherman, R. (2015): <i>Business Intelligence Guidebook – From Data Integration to Analytics</i>, Waltham: Morgan Kaufmann.</li> <li>• Simon, A. (2014): <i>Modern Enterprise Business Intelligence and Data Management – A Roadmap for IT Directors, Managers, and Architects</i>, Waltham: Morgan Kaufmann.</li> </ul>

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## Elective Module 1: SAPE - Production-related Business Processes with SAP Software Solutions

Module profile			
Module ID	SAPE		
Module name	Production-related Business Processes with SAP Software Solutions		
Exam number	3817244		
Duration	1 semester		
Frequency	Winter and/or summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation	
Responsible	Mr. Senner
Lecturer(s)	Mr. Senner
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester  Core elective module Applicable for Digital Business
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	-

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO <b>or</b> soP (= other examined assignment) according to §§ 26, 27 APO

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Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

### Learning outcomes, content and literature

Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Describe and use the central software solutions of the SAP portfolio and their software functionalities and architecture.</li> <li>• Explain and perform current and innovative IT technologies for the realisation and optimization of business processes in the SAP solution environment.</li> <li>• Classify and examine the industry 4.0 concept in the conceptual world of Internet of Things and the digital transformation.</li> <li>• Execute and subdivide business processes across the entire value chain using SAP products in order to design optimized process scenarios.</li> <li>• Identify end-to-end processes, recognizing horizontal and vertical integration in order to derive and develop optimization potential.</li> <li>• Explain, execute and evaluate processes of shop floor data collection through the Manufacturing Execution Level (MES) to the SAP Top Floor solutions.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Terms and Concepts from the SAP Portfolio.</li> <li>• New technologies and a paradigm shift in the IT landscape.</li> <li>• Introduction to the terminology and technologies used in the Internet of Things (IoT) of the SAP Leonardo portfolio.</li> <li>• Methods, approaches and solutions in the area of industry 4.0 (Smart Factory).</li> <li>• Handling, applying and systematically working with different SAP solutions.</li> <li>• Concept of end-to-end processes and integration levels in business process scenarios.</li> <li>• Presentation, implementation and discussion of selected use cases.</li> <li>• Structuring, applying and customizing of SAP products for the implementation of business processes.</li> </ul>

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Literature	<ul style="list-style-type: none"> <li>• Bélanger, F.; and Crossler, R. E. (2019): <i>Information systems for business: an experiential approach</i>, edition 3.0, Burlington, Vermont, Prospect Press.</li> <li>• Bhattacharjee, D.; Narasimhamurti, V.; Desai, C.; Vazquez, G. V. and Walsh, T. (2019): <i>Logistics with SAP S/4HANA: An Introduction</i>, edition 2.0, Bosten (MA): Rheinwerk Publishing.</li> <li>• Erasmus, P.; Rao, V. V.; Sinha, A. and Wadawadigi, G. (2019): <i>SAP Leonardo: An Introduction to the Intelligent Enterprise</i>, Bosten (MA): Rheinwerk Publishing.</li> <li>• Bardhan D.; Baumgartl, A.; Choi, N.-S.; Dudgeon, M.; Lahiri, A.; Meijerink, B. and Worsley-Tonks, A. (2019): <i>SAP S/4HANA: An Introduction</i>, edition 3.0, Bosten (MA): Rheinwerk Publishing.</li> </ul>
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## Elective Module 2: ERPE- ERP Systems and Digital Transformation

Please see [Elective Module 4: ERPE- ERP Systems and Digital Transformation](#)

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### Elective Module 3: BI2E - Business Intelligence II

Module profile			
Module ID	BI2E		
Module name	Business Intelligence II		
Exam number	3817246		
Duration	1 semester		
Frequency	Winter and/or summer semester		
Credit hours (SWS)	4		
ECTS-Credits (CP)	5		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	150	60	90
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation	
Responsible	Prof. Dr. Knobloch
Lecturer(s)	Prof. Dr. Knobloch
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBE 4 <sup>th</sup> /5 <sup>th</sup> semester  Core elective module Applicable for Digital Business
Particular conditions for the participation in the <b>module</b> according to the SPO	-
Recommended prerequisites for the participation in the <b>module</b>	-

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	-
Examination - type	sP (= written examination) according to § 23 APO <b>or</b> soP (= other examined assignment) according to §§ 26, 27 APO

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Examination - length/format	<ul style="list-style-type: none"> <li>• If sP: 90 minutes</li> <li>• If soP <b>one</b> of the following formats: <ul style="list-style-type: none"> <li>○ seminar paper/research project</li> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> <li>○ colloquium</li> <li>○ written assignment</li> <li>○ portfolio assignment</li> <li>○ practical or artistic assignment</li> </ul> </li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

### Learning outcomes, content and literature

Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Identify, describe and classify challenges and problems related with big data (high data volume, heterogeneous data types, high dynamics) together with suitable solution options.</li> <li>• Explain components of analytical infrastructures for big data, distinguish them from classical Business Intelligence systems, and identify interfaces between these classes of systems.</li> <li>• Describe, classify and select suitable processing models, systems architectures, platforms, and provisioning models.</li> <li>• Identify and explain potential use cases of data science for business, and plan appropriate analytical applications.</li> <li>• Discuss and classify approaches and techniques for capturing, storing, transforming, and analysing unstructured, heterogeneous internal and external data, and identify suitable tools and processes for these tasks.</li> <li>• Apply selected analytical techniques and tools.</li> </ul>
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Content	<ul style="list-style-type: none"> <li>• Characteristics, problems, and implications of big data;</li> <li>• Platforms, systems, and processing models for transforming, storing, and analysing very large volumes of structured and unstructured data;</li> <li>• Functional and architectural models of analytical infrastructures for big data, organised by the following aspects: <ul style="list-style-type: none"> <li>○ <i>Data transformation</i>: Tasks and techniques for information extraction from unstructured data, for transforming very large data volumes and data streams, distributed processing models and Map/Reduce, real-time, Lambda and Kappa architectures;</li> <li>○ <i>Data storage</i>: Foundations and implementations of analytical data storage systems, in-memory and NoSQL database systems, schema-less data structures, distributed storage models and partitioning, data lakes, data modelling according to Data Vault approach;</li> <li>○ <i>Data deployment</i>: Analytical sandboxes, cloud and on-premise deployment; open-source platforms;</li> <li>○ <i>Data analysis</i>: Concepts and tools for analysing data using data mining and data science techniques; programming environments for data analysis;</li> </ul> </li> <li>• Procedures and practices for planning and developing big data applications, agile development methods.</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Cady, F. (2017): <i>The Data Science Handbook</i>, Hoboken: John Wiley &amp; Sons Inc.</li> <li>• Gorelik, A. (2019): <i>The Enterprise Big Data Lake - Delivering the Promise of Big Data and Data Science</i>, Sebastopol: O'Reilly.</li> <li>• Inmon, W. H. and Linstedt, D. (2015): <i>Data Architecture: A Primer for the Data Scientist - Big Data, Data Warehouse and Data Vault</i>, Amsterdam: Morgan Kaufmann.</li> <li>• Mohanty, H.; Bhuyan, P. and Chenthati, D. (2015): <i>Big Data - A Primer</i>, New Delhi: Springer India.</li> <li>• Provost, F. and Fawcett, T. (2013): <i>Data Science for Business</i>, Beijing: O'Reilly.</li> </ul>

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### Appendix 3: Catalogue of experiments for the Module Laboratory Tests

To complete the module Laboratory Tests successfully, ten successfully completed individual experiments are required. A list of offered experiments (at the point of publication of this module handbook) is given below. The actually available experiments can be found in the [e-learning course "Laboratory Tests"](#) (prior registration in e-learning is required). There you can also book your places.

#### Possible lab experiments Faculty of Mechanical Engineering

Experiment	Supervisor
Introduction Calorimeter	Dr. Bode-Wilke, S. Hauer
3D-CAD Introduction - basic course	Prof. Dr. Bunsen
Pressure drop in piping systems	Prof. Dr. Möbus, W. Schwarz, B. Eng. M. Sauer
Fuel Cell	Prof. Dr. Paulus, W. Schwarz, B. Eng. M. Sauer
Assembly Press	Prof. Dr. Sommer, Mr. Helfrich, Mr. Wagenhäuser
Gauge and process capability	Prof. Dr. Sommer, Mr. Helfrich, Mr. Wagenhäuser
3D measuring machine	N.N.
Image processing	N.N.
Tube flow	N.N.
Rotational Viskosimetry	Prof. Dr. Schlachter, Mr. Wenzel
Mechanical Spring Characteristic	Prof. Dr. Schlachter, Mr. Eisenbacher

#### Possible lab experiments Faculty of Electrical Engineering

Experiment	Supervisor
Voltage Divider	Dr. Manara
Wheatstone Bridge	Dr. Manara
Segway	Prof. Dr. Hirn
Simulation of Dynamic Systems using Matlab-Simulink	Prof. Dr. Hirn
Digital Circuits	F. Spieß
Oscilloscope	N.N.
3D-Print	Prof. Dr. Hirn
Field calculation with finite element method	Prof. Dr. Zink



## Possible lab experiments Faculty of Business and Engineering

Experiment	Supervisor
Material Flow Optimisation: Dimensioning of a toll station	M. Ullerich
Material Flow Optimisation: Cash desk dimensioning of a discounter	M. Ullerich
ERP Lab	Prof. Dr. Dobhan, J. Beckert
SAP Lab	J. Senner
Age simulation suit: to senior citizens in a few minutes	J. Römisch

Additionally, the possible lab experiments from the German Bachelor's programme Wirtschaftsingenieurwesen (BWW) can be taken. For more information about these experiments, please refer to the Module Handbook for the B.Eng. Programme Wirtschaftsingenieurwesen (BWW) or the respective e-learning course „[Laborschein WI](#)“.

## Appendix 4: Catalogue of Courses for the Module Core Competences 2

For the module Core Competences 2, one of the following courses must be completed. As the courses on offer are changing regularly, the actually available courses will be published every semester.

Module ID	Module name	Language of instruction
BUET	<a href="#">Business and Ethics</a>	English
ICC	<a href="#">Intercultural Communication</a>	English
PRSK	<a href="#">Presentation Skills</a>	English
STCO	<a href="#">Stress- and Conflict-Management</a>	English
TISO	<a href="#">Time and Self Management</a>	English

Additionally, the following courses from the German Bachelor's programme Wirtschaftsingenieurwesen (BWW) can be taken:

Module ID	Module name	Language of instruction
IKO	Interkulturelle Kompetenz	German
PRTE	Präsentationstechniken	German
RHET	Rhetorik	German
STKO	Stress- und Konfliktmanagement	German
VERH	Verhandlungsführung	German
UETH	Angewandte Unternehmensethik - Werteorientierung	German
ZESE	Zeit- und Selbstmanagement	German

For more information about these courses, please refer to the Module Handbook for the B.Eng. Programme Wirtschaftsingenieurwesen (BWW).

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## BUET - Business and Ethics

Module profile				
Module ID	BUET			
Module name	Business and Ethics			
Exam number	BWW -	IBE 3827300	BLO -	IBL 3917600
Duration	1 semester			
Frequency	Winter or summer semester			
Credit hours (SWS)	2			
ECTS-Credits (CP)	2			
Workload	Total workload	Amount of Attendance time	Amount of Self-study time	
Respective hours	60	30	30	
Teaching format	S (=seminar)			
Language of instruction	English			
Module profile				
Module ID	BUET			
Module name	Business and Ethics			
Exam number	3930760			
Duration	1 semester			
Frequency	Winter and summer semester			
Credit hours (SWS)	2			
ECTS-Credits (CP)	2			
Workload	Total workload	Amount of Attendance time	Amount of Self-study time	
Respective hours	60	30	30	
Teaching format	S (= seminar)			
Language of instruction	English			

Organisation		
Responsible	Prof. Dr. Kraus	
Lecturer(s)	Prof. Dr. Ankenbrand, Prof. Dr. Kraus	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBL 7 <sup>th</sup> semester  Elective module -	IBE 7 <sup>th</sup> semester  Elective module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-	
Recommended prerequisites for the participation in the <b>module</b>	Successful passing of the module COC1.	

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Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	Compulsory attendance of the class.
Examination - type	soP (= other examined assignment) according to §§ 26, 27 APO
Examination - length/format	<p><b>One</b> of the following formats:</p> <ul style="list-style-type: none"> <li>• seminar paper/research project</li> <li>• multimedia presentation</li> <li>• written assignment</li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Describe the basic terms and contents of recognised standards catalogues.</li> <li>• Know which factors are used to describe responsibility and trust.</li> <li>• Be able to explain the concept of analysis for worldviews and its elements as well as generic examples.</li> <li>• Be able to explain the dual nature of values and their normative core functions in companies.</li> <li>• To know the structure of a goal-oriented value-based argumentation.</li> <li>• to be able to describe their own and others' ideological imprints and to name values that can be derived from them by way of example (reflective competence) as well as to apply them to concrete dilemmas through justified recommendations for action (action competence).</li> <li>• Develop and discuss goal-oriented arguments for different stakeholder groups on the basis of a specific set of values or norms (discourse and persuasion competence).</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Ethics, Values, Morals &amp; Norms: Functions and Relevance in Businesses and Organisations</li> <li>• Worldview analysis: Philosophical foundations of specific values</li> <li>• Multi-rational management: Dealing professionally with contradictions and dilemmas in companies and organisations</li> <li>• Value orientation as normative ethics: Use of values and argumentation with values in corporate management</li> <li>• Concept of Corporate Responsibility &amp; Sustainability</li> <li>• Trust as a core factor of functioning market exchange relationships</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Bauer, J. J.; McAdams, D. P. and Pals, J. L. (2008): <i>Narrative identity and eudaimonic well-being</i>. Journal of Happiness Studies, 9(1), 81-104. <a href="https://doi.org/10.1007/s10902-006-9021-6">https://doi.org/10.1007/s10902-006-9021-6</a>.</li> <li>• Brunelli, S. and Di Carlo, E. (Eds.). (2020): <i>Accountability, Ethics and Sustainability of Organizations</i>. Springer International Publishing, <a href="https://doi.org/10.1007/978-3-030-31193-3">https://doi.org/10.1007/978-3-030-31193-3</a>.</li> </ul>

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	<ul style="list-style-type: none"> <li>• Schäfer, H. (2019): <i>On Values: The (Hidden) Ethical Framework in Capital Market Theory (An Outline of Ethics in Economics and Finance)</i>. In <i>On Values in Finance and Ethics: Forgotten Trails and Promising Pathways</i> (pp. 27–42). Springer International Publishing. <a href="https://doi.org/10.1007/978-3-030-04684-2_3">https://doi.org/10.1007/978-3-030-04684-2_3</a>.</li> <li>• Storchevoy, M. (2018): <i>Business Ethics as a Science</i>. Springer International Publishing, <a href="https://doi.org/10.1007/978-3-319-68861-9">https://doi.org/10.1007/978-3-319-68861-9</a>.</li> </ul>
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## ICC - Intercultural Communication

Module profile			
Module ID	ICC		
Module name	Intercultural Communication		
Exam number	3930760		
Duration	1 semester		
Frequency	Winter and summer semester		
Credit hours (SWS)	2		
ECTS-Credits (CP)	2		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	60	30	30
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation		
Responsible	N.N.	
Lecturer(s)	Ms. Shendrick; Prof. Dr. Stadelmann	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBL 7 <sup>th</sup> semester  Elective module -	IBE 7 <sup>th</sup> semester  Elective module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-	
Recommended prerequisites for the participation in the <b>module</b>	Successful passing of the module COC1.	

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	Compulsory attendance of the class.
Examination - type	soP (= other examined assignment) according to §§ 26, 27 APO
Examination - length/format	<p><b>One</b> of the following formats:</p> <ul style="list-style-type: none"> <li>• seminar paper/research project</li> <li>• multimedia presentation</li> <li>• written assignment</li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

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### Learning outcomes, content and literature

Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Outline the most important theoretical approaches to intercultural communication.</li> <li>• Explain the impact of one's own cultural conditioning on values, perception, expectations and behavior.</li> <li>• Interpret the behaviour of people from different cultures considering their respective cultural values.</li> <li>• Create and apply effective communications strategies to overcome obstacles in intercultural encounters.</li> <li>• Analyse intercultural business encounters by applying intercultural terminology, theory and methods and adopt the own behavior accordingly.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Introduction and Basic Knowledge: concept of culture, cultural identity, perception and interpretation, stereotypes and prejudices.</li> <li>• Cultural Dimensions as a theoretical framework to compare cultures: mainly individualism vs. collectivism, high vs. low power distance, deal- vs. relationship orientation. Focus is on different communication styles (verbal and non-verbal communication).</li> <li>• Application in business: multicultural teamwork, virtual teamwork, meetings with team members from different cultures, presentations in front of an international audience, leading culturally diverse teams.</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Adler, N. J. and Gundersen, A. (2008): <i>International dimensions of organizational behavior</i>, 5<sup>th</sup> ed., Mason: Thomson South-Western.</li> <li>• Comfort, J. and Franklin, P. (2014): <i>The Mindful International Manager. How to work effectively across cultures</i>, 2<sup>nd</sup> ed., London: Kogan Page.</li> <li>• Hofstede, G.; Hofstede, G. J. and Minkov, M. (2010): <i>Cultures and organizations. Software of the mind: International cooperation and its importance for survival</i>, 3<sup>rd</sup> ed., New York: McGraw-Hill.</li> <li>• Schroll-Machl, S. (2016): <i>Doing business with Germans. Their perception, our perception</i>, 6<sup>th</sup> ed., Göttingen: Vandenhoeck &amp; Ruprecht.</li> </ul>

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## PRSK - Presentation Skills

Module profile				
Module ID	PRSK			
Module name	Presentation Skills			
Exam number	BWW -	IBE 3827300	BLO -	IBL 3917600
Duration	1 semester			
Frequency	Winter and Summer semester			
Credit hours (SWS)	2			
ECTS-Credits (CP)	2			
Workload	Total workload	Amount of Attend- ance time	Amount of Self-study time	
Respective hours	60	30	30	
Teaching format	S (= seminar)			
Language of instruction	English			
Module profile				
Module ID	PRSK			
Module name	Presentation Skills			
Exam number	3930760			
Duration	1 semester			
Frequency	Winter and summer semester			
Credit hours (SWS)	2			
ECTS-Credits (CP)	2			
Workload	Total workload	Amount of Attend- ance time	Amount of Self-study time	
Respective hours	60	30	30	
Teaching format	S (= seminar)			
Language of instruction	English			

Organisation		
Responsible	Prof. Dr. Brake	
Lecturer(s)	Prof. Dr. Panshef	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBL 7 <sup>th</sup> semester  Elective module -	IBE 7 <sup>th</sup> semester  Elective module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-	
Recommended prerequisites for the participation in the <b>module</b>	Successful passing of the module COC1.	



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Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	Compulsory attendance of the class.
Examination - type	soP (= other examined assignment) according to §§ 26, 27 APO
Examination - length/format	<p><b>One</b> of the following formats:</p> <ul style="list-style-type: none"> <li>○ presentation</li> <li>○ multimedia presentation</li> <li>○ documentation report</li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.
Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Use presentation techniques and to show how these can be used in different/varying situations.</li> <li>• Identify and name the impact factors of short and long presentations and test them in specialised conversations and lectures.</li> <li>• Analyse the communication processes of a presentation and to actively design these processes with regard to the aims of the presentation.</li> <li>• Adapt presentation topics to a target group and to present these topics logically and in an appropriate register.</li> <li>• Use media correctly and visualise it in a suitable way.</li> <li>• Give a convincing, audience-related presentation.</li> </ul>
Content	<p>Professional contents of the module:</p> <ul style="list-style-type: none"> <li>• Basic elements of a presentation</li> <li>• Examples of different presentation techniques</li> <li>• Basic presentation skills</li> <li>• Rules of communication</li> <li>• Preparation and delivery of different types of presentations</li> </ul> <p>Methodological contents of the module:</p> <ul style="list-style-type: none"> <li>• Direct and multimedia presentation of learning content</li> <li>• Role play</li> <li>• Workshop</li> <li>• Individual presentation</li> <li>• Peer assessment</li> </ul>

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Literature	<ul style="list-style-type: none"> <li>• Platow, M. (2002): <i>Giving Professional Presentations in the Behavioral Sciences and Related Fields</i>, New York: Psychology Press.</li> <li>• Williams, E. (2008): <i>Presentations in English. Find your voice as presenter</i>, Oxford: Macmillan.</li> <li>• Wallwork, A. (2014): <i>Presentations, Demos, and Training Sessions. A Guide to Professional English</i>, New York: Springer.</li> <li>• Van Emden, J. and Becker, L. (2016): <i>Presentation skills for students</i>, London: Palgrave.</li> <li>• Bovée, C. and Thill, J. (2020): <i>Business Communication Essentials. Fundamental Skills for the Mobile-Digital-Social Workplace</i>, 8<sup>th</sup> ed., Harlow: Pearson.</li> </ul>
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## STCO - Stress- and Conflict Management

Module profile			
Module ID	STCO		
Module name	Stress- and Conflict-Management		
Exam number	3930760		
Duration	1 semester		
Frequency	Winter and summer semester		
Credit hours (SWS)	2		
ECTS-Credits (CP)	2		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	60	30	30
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation		
Responsible	N.N.	
Lecturer(s)	Hr. Stüwe	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBL 7 <sup>th</sup> semester  Elective module -	IBE 7 <sup>th</sup> semester  Elective module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-	
Recommended prerequisites for the participation in the <b>module</b>	Successful passing of the module COC1.	

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	Compulsory attendance of the class.
Examination - type	soP (= other examined assignment) according to §§ 26, 27 APO
Examination - length/format	<b>One</b> of the following formats: <ul style="list-style-type: none"> <li>• seminar paper/research project</li> <li>• multimedia presentation</li> <li>• written assignment</li> </ul> The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a> .
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

Learning outcomes, content and literature	
Learning outcomes	<p>After successful completion of the module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Define, explain and evaluate stress situations.</li> <li>• Derive and create concrete forms of action to deal with stress situations.</li> <li>• Use the preventive measures learned.</li> <li>• Name mediative techniques and to use them situationally.</li> <li>• Recognize conflicts, understand and develop solutions based on specific patterns.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Introduction and overview of current stress and conflict management theories</li> <li>• Recognize, evaluate and find solutions to stress</li> <li>• Understand healthy and unhealthy stress</li> <li>• Development of individual stress regulators</li> <li>• Identify and evaluate conflicts and find solutions</li> <li>• Solutions for conflicts in groups</li> <li>• Strategies for dealing with conflicts</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Berne, E. (2002): <i>Games People Play: The Psychology of Human Relationship</i>, New York: Grove Press.</li> <li>• Fisher, R. and Ury, W. (2011): <i>Getting to Yes: Negotiating Agreement Without Giving In</i>, London: Penguin Books.</li> <li>• Glasl, F. (1999): <i>Confronting conflict: a first-aid kit for handling conflict</i>, Stroud, Gloucestershire: Hawthorn Press.</li> </ul>

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## TISE - Time- and Self-Management

Module profile			
Module ID	TISE		
Module name	Time- and Self-Management		
Exam number	3930760		
Duration	1 semester		
Frequency	Winter and summer semester		
Credit hours (SWS)	2		
ECTS-Credits (CP)	2		
Workload	Total workload	Amount of Attendance time	Amount of Self-study time
Respective hours	60	30	30
Teaching format	S (= seminar)		
Language of instruction	English		

Organisation		
Responsible	N.N.	
Lecturer(s)	Prof. Dr. Stadelmann	
Applicability; Semester according to SPO; Type of module; If applicable specialisation	IBL 7 <sup>th</sup> semester  Elective module -	IBE 7 <sup>th</sup> semester  Elective module -
Particular conditions for the participation in the <b>module</b> according to the SPO	-	
Recommended prerequisites for the participation in the <b>module</b>	Successful passing of the module COC1.	

Examination	
Particular conditions for the participation in the <b>examination</b> according to the SPO appendix	Compulsory attendance of the class.
Examination - type	soP (= other examined assignment) according to §§ 26, 27 APO
Examination - length/format	<p><b>One</b> of the following formats:</p> <ul style="list-style-type: none"> <li>• seminar paper/research project</li> <li>• multimedia presentation</li> <li>• written assignment</li> </ul> <p>The concrete length/format of the examination will be determined in the curriculum and published at the beginning of each semester in the e-Learning course <a href="#">“Studien- und Prüfungsangelegenheiten/study and examination matters”</a>.</p>
Language of examination	English
Condition for the award of credit points	Successful passing of the examination.

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Learning outcomes, content and literature	
Learning outcomes	<p>On successful completion of this module, the learner should be able to:</p> <ul style="list-style-type: none"> <li>• Distinguish different dimensions of time, as well as cultural and personal preferences in dealing with time.</li> <li>• Reflect and analyse one's own way of dealing with time and one's own work behaviour.</li> <li>• Name, understand and put into practice techniques of time- and self-management.</li> <li>• Set and realise goals and priorities in the short, medium and long term.</li> <li>• Recognise and analyse personal stress factors and eliminate them using preventive techniques.</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Basics of time and self-management</li> <li>• Typical problems in managing time</li> <li>• Setting objectives and defining steps to achieve them</li> <li>• Planning (Performance curve, priorities, planning techniques)</li> <li>• Work and study organization (learning, transcripts, workplace, organisation system)</li> <li>• Stress and stress management</li> </ul>
Literature	<ul style="list-style-type: none"> <li>• Forsyth, P. (2016): <i>Successful Time Management. How to be organized, productive and get things done</i>, 5<sup>th</sup> ed., London: Kogan Page.</li> <li>• Lussier R. N. (2017): <i>Human Relations in Organizations. Applications and Skill Building</i>, 10<sup>th</sup> ed., New York: McGraw-Hill Education.</li> <li>• Zimbardo, P. G. and Boyd, J. (2010): <i>The time paradox. Using the new psychology of time to your advantage</i>, London: Rider.</li> </ul>