Amtliche Bekanntmachungen der TU Bergakademie Freiberg

Nr. 17, Heft 2 vom 06. Mai 2019

Modulhandbuch

für den

Internationalen Masterstudiengang

Mechanical and Process Engineering

Inhaltsverzeichnis

Abkürzungen

KA: schriftliche Klausur / written exam
MP: mündliche Prüfung / oral examination
AP: alternative Prüfungsleistung / alternative examination
PVL: Prüfungsvorleistung / prerequisite
MP/KA: mündliche oder schriftliche Prüfungsleistung (abhängig von Teilnehmerzahl) / written or oral examination (dependent on number of students)

SS, SoSe: Sommersemester / sommer semester
WS, WiSe: Wintersemester / winter semester

SX: Lehrveranstaltung in Semester X des Moduls / lecture in module semester x

SWS: Semesterwochenstunden

Data:	ATD. MA. Nr. 3617 / Examination number: 41216	Version: 10.10.2017	Start Year: SoSe 2019
Module Name:	**Applied Thermodynamics**		
(English):			
Responsible:	Fieback, Tobias / Prof. Dr. Ing.		
Lecturer(s):	Fieback, Tobias / Prof. Dr. Ing.		
Institute(s):	Institute of Thermal Engineering		
Duration:	1 Semester(s)		
Competencies:	- knowledge of extended thermodynamic principles - appyling of those principles to thermodynamic processes, apparatuses and machines - development and optimization of thermodynamic processes, apparatuses and machines under thermodynamic point of view		
Contents:	Applying thermodynamic principles to mechanical and process engineering: - Fundamentals of thermodynamics (equations of state, reversible processes, system boundaries) - First and second law of thermodynamics - Thermodynamic properties of pure fluid substances - Thermodynamics of simple mixtures These already known methods will be applied to different processes to find optimization potential or develop new processes. In addiation based on these principles measuring devices will be developed to get fundamental data for general process development. Finally thermodynamics will be applied to existing machines to find again optimization potential and energy efficient alternatives.		
Literature:			
Types of Teaching:	S1 (SS): Lectures (2 SWS) S1 (SS): Exercises (1 SWS)		
Pre-requisites:	**Recommendations:** Thermodynamics and Heat Transfer, 2017-08-29		
Frequency:	yearly in the summer semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: MP/KA (KA if 10 students or more) [MP minimum 30 min / KA 180 min]		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: MP/KA (KA bei 10 und mehr Teilnehmern) [MP mindestens 30 min / KA 180 min]		
Credit Points:	4		
Grade:	The Grade is generated from the examination result(s) with the following weights (w): MP/KA [w: 1]		
Workload:	The workload is 120h. It is the result of 45h attendance and 75h self-studies.		

Data:	CMCRMI. MA. Nr. 3626 / Examination number: 42810	Version: 19.09.2017	Start Year: WiSe 2019
Module Name:	**Classifying Machines, Crushers, Mills**		
(English):			
Responsible:	Lieberwirth, Holger / Prof. Dr.-Ing.		
Lecturer(s):	Meltke, Klaus / Dr.-Ing.		
Institute(s):	Institute of Mineral Processing Machines		
Duration:	1 Semester(s)		
Competencies:	The students will be enabled to select, calculate and design classifying machines, crushers and mills according to the specific requirements of their applications.		
Contents:	Planning and design of classifying machines, crushers and mills (Static, Vibrating and Drum Screens, Cyclons and Air Separators; Jaw, Double Roll, Cone, Gyratory, Hammer and Impact Crushers; Tumbling, High Pressure Grinding, Vertical Roller, Vibrating, Stirred Media, Impact, Beater and Jet Mills)		
Literature:	Wills, B.A.; Napier-Munn, T.J.: Mineral Processing Technology, Elsevier, 2007 Gupta, A.; Yan, D.: Mineral Processing, Design and Operations, Elsevier, 2016 Metso: Crushing and Screening Handbook, 2006 Höffl, K.: Zerkleinerungs- und Klassiermaschinen, Dt. Verlag für Grundstoffindustrie, Leipzig 1985		
Types of Teaching:	S1 (WS): Lectures (2 SWS) S1 (WS): Exercises (1 SWS) S1 (WS): Experimental trainings, exercises and a design exercise. / Practical Application (1 SWS)		
Pre-requisites:			
Frequency:	yearly in the winter semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: MP/KA (KA if 10 students or more) [MP minimum 30 min / KA 90 min] PVL: At least 90% of the exercises are completed successfully (protocols). PVL have to be satisfied before the examination.		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: MP/KA (KA bei 10 und mehr Teilnehmern) [MP mindestens 30 min / KA 90 min] PVL: Mindestens 90 % der Praktika und Übungen erfolgreich absolviert (Protokolle). PVL müssen vor Prüfungsantritt erfüllt sein bzw. nachgewiesen werden.		
Credit Points:	5		
Grade:	The Grade is generated from the examination result(s) with the following weights (w): MP/KA [w: 1]		
Workload:	The workload is 150h. It is the result of 60h attendance and 90h self-studies. The latter includes the preparation and preparation of the exercises, experimental trainings and preparation for the examination.		

Data:	COMPROE. MA. Nr. 3627 / Examination number: 40417	Version: 22.09.2017	Start Year: WiSe 2018
Module Name:	**Computational Process Engineering**		
(English):			
Responsible:	Meyer, Bernd / Prof. Dr.-Ing.		
Lecturer(s):	Richter, Andreas / Dr.-Ing.		
Institute(s):	Institute of Energy Process Engineering and Chemical Engineering		
Duration:	1 Semester(s)		
Competencies:	The students learn various approaches for modeling fluid dynamics and chemical processes and sub-processes, covering simple equilibrium approaches as well as advanced techniques such as computational fluid dynamics (CFD). They will be able to compare modeling approaches and point out advantages and disadvantages for various sub-processes of a process plant. With this knowledge, the student is able to identify the most appropriate modeling approach for the solution of specific problems. This involves the necessary accuracy of the model as well as the required modeling and computational costs. The students can further apply the modeling approaches to simple systems and know the possibilities for the analysis and optimization of the respective process.		
Contents:	The course covers various stationary modeling approaches, their physical principles, typical solution methods, and respective advantages and disadvantages. This involves equilibrium and stirred-tank reactor models (0d), reactive and non-reactive plug flows as well as axial dispersion models (1d), computational fluid dynamics (2d and 3d), and network models. Based on an exemplary test facility, the question will be answered, which modeling approach is favorable for the specific sub-process. A modeling or simulation based analysis of the selected sub-processes will be conducted in seminars. Finally, approaches for process optimization are given.		
Literature:	H.K. Versteeg, M. Malalasekera: An Introduction to Computational Fluid Dynamics. The Finite Volume Method. 2nd Ed., Pearson Education Limited, 2007. J. Ingham, I.J. Dunn, E. Heinzle, J.E. Prenosil, J.B. Snape: Chemical Engineering Dynamics: An Introduction to Modelling and Computer Simulation. 3rd Ed., Wiley-VCH, 2007. A.K. Verma: Process Modelling and Simulation in Chemical, Biochemical and Environmental Engineering. CRC Press, 2014.		
Types of Teaching:	S1 (WS): Lectures (2 SWS) S1 (WS): Exercises (1 SWS)		
Pre-requisites:	**Mandatory:** Thermodynamics and Heat Transfer, 2017-08-29 Training in Fluid Dynamics, 2017-03-29 **Recommendations:** Basic knowledge in fluid dynamics, thermodynamics, heat and mass transfer, and in chemical processes.		
Frequency:	yearly in the winter semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: MP/KA (KA if 10 students or more) [MP minimum 30 min / KA 90 min]		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: MP/KA (KA bei 10 und mehr Teilnehmern) [MP mindestens 30 min / KA 90 min]		
Credit Points:	4		

Grade:	The Grade is generated from the examination result(s) with the following weights (w): MP/KA [w: 1]
Workload:	The workload is 120h. It is the result of 45h attendance and 75h self-studies.

Data:	Examination number: 40315	Version: 21.08.2017	Start Year: WiSe
Module Name:	**Conception of Process Equipment**		
(English):			
Responsible:	Peuker, Urs Alexander / Prof. Dr.-Ing.		
Lecturer(s):	Peuker, Urs Alexander / Prof. Dr.-Ing.		
Institute(s):	Institute of Mechanical Process Engineering and Mineral Processing		
Duration:	1 Semester(s)		
Competencies:	The aim is the teaching of engineering thinking to (mineral) process engineers. It brings together the approaches of mechanical engineering and the process laws of process engineering. The students learn to analyze how a unit-operation is set up in an apparatus. The module further introduces material laws of suspensions, wet and dry powders and particle beds. Auxiliary units like pumps, gas filters, mixing vessels and industrial waste water technology are introduced.		
Contents:	Design strategies • Design of apparatus / design of process • Analyze of unit operation and process equipment • Conceptual design • Functionality • New principles / parallelizing / serializing Material laws • Suspension Rheology • Solids Mechanics • Agglomerate durability • compression laws Auxiliary equipment • Mixing vessels • Gas cleaning by filters • Settlers • Liquid filters • Membranes		
Literature:	to be annonced		
Types of Teaching:	S1 (WS): Lectures (2 SWS)		
Pre-requisites:			
Frequency:	yearly in the winter semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: MP/KA (KA if 8 students or more) [MP minimum 30 min / KA 120 min]		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: MP/KA (KA bei 8 und mehr Teilnehmern) [MP mindestens 30 min / KA 120 min]		
Credit Points:	3		
Grade:	The Grade is generated from the examination result(s) with the following weights (w): MP/KA [w: 1]		
Workload:	The workload is 90h. It is the result of 30h attendance and 60h self-studies.		

Daten:	DEU A1/ 1.Sem. Nr. 948 / Prüfungs-Nr.: 71101	Stand: 04.08.2017	Start: WiSe 2016
Modulname:	**Deutsch A1/ 1. Semester**		
(englisch):	German A 1/ 1st Semester		
Verantwortlich(e):	Bellmann, Kerstin		
Dozent(en):			
Institut(e):	Internationales Universitätszentrum		
Dauer:	1 Semester		
Qualifikationsziele / Kompetenzen:	Im Kurs werden Grundlagen in Phonetik, Orthographie, Grammatik und Lexik vermittelt. Die Teilnehmer erwerben Grundkenntnisse und Grundfertigkeiten im Hören, Sprechen, Lesen und Schreiben auf der Basis der Allgemeinsprache sowie landeskundliche Kenntnisse.		
Inhalte:	Kommunikation im Alltag (Menschen kennen lernen, Einkaufen, Restaurantbesuch, Tagesabläufe, Uhrzeit); Grammatik: zum Beispiel Fragestellungen, Zahlen, Konjugation der Verben, Präsenz und Präteritum, Mengenangaben, Plural der Nomen, Komposita		
Typische Fachliteratur:	Begegnungen A1+, Schubert Verlag		
Lehrformen:	S1 (WS): Übung (4 SWS)		
Voraussetzungen für die Teilnahme:	**Empfohlen:** Keine Vorkenntnisse der deutschen Sprache notwendig		
Turnus:	jährlich im Wintersemester		
Voraussetzungen für die Vergabe von Leistungspunkten:	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: KA [90 min] PVL: Erfolgreiche aktive Teilnahme an mindestens 80% des Unterrichts PVL müssen vor Prüfungsantritt erfüllt sein bzw. nachgewiesen werden.		
Leistungspunkte:	4		
Note:	Die Note ergibt sich entsprechend der Gewichtung (w) aus folgenden(r) Prüfungsleistung(en): KA [w: 1]		
Arbeitsaufwand:	Der Zeitaufwand beträgt 120h und setzt sich zusammen aus 60h Präsenzzeit und 60h Selbststudium.		

Daten:	DEU A1/ 2. Sem. BA. Nr. 949 / Prüfungs-Nr.: 71102	Stand: 04.08.2017	Start: SoSe 2017
Modulname:	**Deutsch A1/ 2. Semester**		
(englisch):	German A1/ 2nd Semester		
Verantwortlich(e):	Bellmann, Kerstin		
Dozent(en):			
Institut(e):	Internationales Universitätszentrum		
Dauer:	1 Semester		
Qualifikationsziele / Kompetenzen:	Im Kurs werden Grundlagen in Phonetik, Orthographie, Grammatik und Lexik vermittelt. Die Teilnehmer erwerben Grundkenntnisse und Grundfertigkeiten im Hören, Sprechen, Lesen und Schreiben auf der Basis der Allgemeinsprache sowie landeskundliche Kenntnisse.		
Inhalte:	Orientierung in der Stadt beziehungsweise in der Firma, öffentliche Verkehrsmittel, Wegbeschreibung, Berufe und Arbeitsalltag, Körper und Gesundheit, Wohnungssuche und -einrichtung, Lebenslauf, Kleidung; Grammatik: zum Beispiel Präpositionen, Frageartikel, Modalverben, Possessivartikel, Perfekt, Konjunktionen, Demonstrativpronomen, Graduierung und Komparativ		
Typische Fachliteratur:	Begegnungen A1+, Schubert Verlag		
Lehrformen:	S1 (SS): Übung (4 SWS)		
Voraussetzungen für die Teilnahme:	**Obligatorisch:** Deutsch A1/ 1. Semester, 2015-08-26 oder äquivalente Sprachkenntnisse		
Turnus:	jährlich im Sommersemester		
Voraussetzungen für die Vergabe von Leistungspunkten:	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: KA [90 min] PVL: Aktive Teilnahme am Unterricht (mindestens 80%) PVL müssen vor Prüfungsantritt erfüllt sein bzw. nachgewiesen werden.		
Leistungspunkte:	4		
Note:	Die Note ergibt sich entsprechend der Gewichtung (w) aus folgenden(r) Prüfungsleistung(en): KA [w: 1]		
Arbeitsaufwand:	Der Zeitaufwand beträgt 120h und setzt sich zusammen aus 60h Präsenzzeit und 60h Selbststudium. Der Zeitaufwand beträgt 120 Stunden und setzt sich zusammen aus 60 Stunden Präsenzzeit und 60 Stunden Selbststudium.		

Data:	DisTheo. MA. Nr. 3206 / Examination number: 45102	Version: 08.06.2017	Start Year: WiSe 2017
Module Name:	**Discrete Element Method**		
(English):			
Responsible:	Schwarze, Rüdiger / Prof. Dr.-Ing.		
Lecturer(s):	Schwarze, Rüdiger / Prof. Dr.-Ing.		
Institute(s):	Institute of Mechanics and Fluid Dynamics		
Duration:	1 Semester(s)		
Competencies:	Students should remember the fundamentals of the discrete element method. They should be able to distinguish the different numerical techniques and algorithms applied in the discrete element method. They should be able to apply the discrete element method to simple problems in the field of granular materials.		
Contents:	Most important ingredients are: • modeling strategy (conceptual and numerical model); classification of DEM • contact detection; interaction force-displacement laws, contact and friction laws • algorithms for solving the equations of motion • modelling of granular material • introduction to simulation tools and software (Yade, LIGGHTS,etc.) • practical hints; applications; practical exercises in 2d and 3d.		
Literature:	Pöschel, T. & Schwager, T.: Computational Granular Dynamics, Springer Jing, L & Stephansson, O.: Fundamentals of Discrete Element Methods for Rock Engineering, Elsevier Matuttis, H.G. & Chen, J.: Understanding the Discrete Element Method, Wiley		
Types of Teaching:	S1 (WS): Discrete Element Method / Lectures (2 SWS) S1 (WS): Discrete Element Method / Exercises (1 SWS)		
Pre-requisites:	**Recommendations:** Fundamental of Microstructures, 2010-12-02 Continuum Mechanics, 2016-07-11 Introduction to Scientific Programming, Fundamentals in mechanics		
Frequency:	yearly in the winter semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: MP/KA (KA if 5 students or more) [MP minimum 30 min / KA 60 min]		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: MP/KA (KA bei 5 und mehr Teilnehmern) [MP mindestens 30 min / KA 60 min]		
Credit Points:	4		
Grade:	The Grade is generated from the examination result(s) with the following weights (w): MP/KA [w: 1]		
Workload:	The workload is 120h. It is the result of 45h attendance and 75h self-studies.		

Data:	ICFD. MA. Nr. 3619 / Examination number: 41912	Version: 20.10.2017	Start Year: SoSe 2019
Module Name:	**Introduction into Computational Fluid Dynamics**		
(English):			
Responsible:	Schwarze, Rüdiger / Prof. Dr.-Ing.		
Lecturer(s):	Schwarze, Rüdiger / Prof. Dr.-Ing. Heinrich, Martin / Dr. Ing.		
Institute(s):	Institute of Mechanics and Fluid Dynamics		
Duration:	1 Semester(s)		
Competencies:	Students shall be enabled to formulate numerical models for the simulation of coupled heat and fluid flow problems. They shall learn the ability to carry out corresponding numerical simulations with common open-source and commercial software packages on PC or cluster computing systems.		
Contents:	An introduction into computational fluid dynamics (CFD) for the simulation of fluid flow problems is given. Among others, the finite-volume method and related numerical techniques are discussed. Students are introduced into modelling approaches for typical flow situations, e. g. incompressible or compressible, laminar or turbulent flows. Common open-source and commercial CFD software packages are presented. The application of CFD to practical flow problems is explained with selected examples.		
Literature:	H. K. Versteeg and W. Malalasekera: An Introduction to Computational Fluid Dynamics - the Finite Volume Method. Essex: Pearson Education, 2007 J. H. Ferziger and M. Peric: Computational Methods for Fluid Dynamics. Berlin: Springer, 2002		
Types of Teaching:	S1 (SS): Lectures (2 SWS) S1 (SS): Exercises (1 SWS)		
Pre-requisites:	**Mandatory:** Training in Fluid Dynamics, 2017-03-29		
Frequency:	yearly in the summer semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: KA [45 min]		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: KA [45 min]		
Credit Points:	4		
Grade:	The Grade is generated from the examination result(s) with the following weights (w): KA [w: 1]		
Workload:	The workload is 120h. It is the result of 45h attendance and 75h self-studies.		

Data:	Examination number: -	Version: 11.02.2019	Start Year: SoSe 2019
Module Name:	**Introduction to the Finite Element Method**		
(English):			
Responsible:	Kiefer, Björn / Prof. PhD.		
Lecturer(s):	Hütter, Geralf / Dr. Ing. Kiefer, Björn / Prof. PhD. Roth, Stephan / Dr. Ing.		
Institute(s):	Institute of Mechanics and Fluid Dynamics		
Duration:	1 Semester(s)		
Competencies:	Students are able to apply the Finite Element Method in order to compute numerical solutions to linear (initial) boundary value problems relevant to mechanics. In addition to having gained hands-on experience with commercial FEM codes, they possess the conceptual understanding and theoretical background to assess and interpret simulation results. This practical and theoretical basis allows students to independently pursue a deeper understanding of the Finite Element Method. The acquired skills are directly transferable to a broad spectrum of problems described by linear partial differential equations in engineering and the natural sciences.		
Contents:	The course gives a concise introduction to the fundamental principles of the Finite Element Method with particular application to linear partial differential equations relevant in solid mechanics. Important ingredients are: strong/weak forms of the equilibrium equations, spatial discretization and shape functions, assembly operations and application of boundary conditions. The method is applied to solving one- and two-dimensional quasistatic boundary value problems. An outlook on the application of the FEM to physically-nonlinear problems is also discussed. Emphasis is further placed on acquiring practical experience with commercial FEM simulation packages (SIMULIA Abaqus FEA). The exercises/assignments include the application of the method to obtain approximate solutions to well-known strength-of-materials type problems.		
Literature:	Bathe, K. J., Finite Element Procedures, Prentice Hall, 1996 Hughes, T. J. R., The Finite Element Method: Linear Static and Dynamic Finite Element Analysis, Dover Publications, 2000 Reddy, J. N., Introduction to the Finite Element Method, McGraw-Hill, 1993 Zienkiewicz, O. C., Taylor, R. L. & Zhu, J. C., The Finite Element Method: Its Basis and Fundamentals, 7. edition, Butterworth-Heinemann, 2013		
Types of Teaching:	S1 (SS): Lectures (1 SWS) S1 (SS): includes "Practical Application Tutorial" / Exercises (1 SWS)		
Pre-requisites:	**Recommendations:** Technische Mechanik, 2009-05-01 Technische Mechanik B - Festigkeitslehre, 2017-06-08 Technische Mechanik A - Statik, 2017-06-08		
Frequency:	yearly in the summer semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: in examination variant 1: AP: Numerical calculation with the finite element method PVL: Performing simulations as part of the practical application tutorial or in examination variant 2:		

	KA [90 min] PVL: Performing simulations as part of the practical application tutoria Variant 2 applies if 15 students or more PVL have to be satisfied before the examination.
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: in Prüfungsvariante 1: AP: Numerische Berechnung mit der Finite-Element-Methode PVL: Simulationen im Rahmen des FEM-Praktikums oder in Prüfungsvariante 2: KA [90 min] PVL: Simulationen im Rahmen des FEM-Praktikums Variante 2 gilt bei 15 und mehr Teilnehmern PVL müssen vor Prüfungsantritt erfüllt sein bzw. nachgewiesen werden.
Credit Points:	4
Grade:	The Grade is generated from the examination result(s) with the following weights (w): in examination variant 1: AP: Numerical calculation with the finite element method [w: 1] or in examination variant 2: KA [w: 1]
Workload:	The workload is 120h. It is the result of 30h attendance and 90h self-studies. The time is needed for the independent study of the lecture contents as well as the preparation of the assignments.

Data:	IUFEN. BA. Nr. / Examination number: 60810	Version: 13.07.2016	Start Year: SoSe 2017
Module Name:	**Investment and Finance**		
(English):			
Responsible:	Horsch, Andreas / Prof. Dr.		
Lecturer(s):	Horsch, Andreas / Prof. Dr.		
Institute(s):	Professor of Investment and Finance		
Duration:	1 Semester(s)		
Competencies:	The module enables students to solve problems of investment and finance by applying basic analytic concepts. Students are able to recognize and distinguish relevant details of financial problems, to interpret them from a cashflow-based view and to apply appropriate tools to it. They are able to calculate fundamental economic ratios (as NPVs) and to conclude based hereupon if a particular financial option is preferable.		
Contents:	The module is concerned with basic concepts of corporate finance and corporate investments. During the first half, students study the concept, application, and drawbacks of evaluation methods like Net Present Value (NPV) and Internal Rate of Return (IRR/MIRR). Hereafter, possibilities to adjust these approaches to imperfect markets (including uncertainty, financing, taxes) are introduced. During the second half, methods of external corporate finance, i.e. equity and debt, are analyzed. Due to the relevance of the institutional framework, in particular universal principles of debt finance are discussed. Structure: 1 Liquidity vs. Profitability 2 Static Investment Analysis 3 Dynamic Investment Analysis 4 Extensions of Dynamic Approaches 5 Structuring Corporate Finance 6 Equity Finance 7 Debt Finance 8 Mezzanine Finance		
Literature:	A selection of recommended papers will be handed out as part of the set of slides. Besides, classic textbooks provide valuable insights, in particular: Brealey/Myers/Allen: Principles of Corporate Finance, 12th ed., New York (McGrawHill) 2016. Van Horne/Wachowicz: Fundamentals of Financial Management, 13th ed., Harlow et al. (Pearson) 2009.		
Types of Teaching:	S1 (SS): With Excercise Parts / Lectures (2 SWS)		
Pre-requisites:	**Recommendations:** Good command of mathematics is desirable. Attending Cost Accounting before this module is recommended.		
Frequency:	yearly in the summer semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: KA [90 min]		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: KA [90 min]		
Credit Points:	3		
Grade:	The Grade is generated from the examination result(s) with the following weights (w): KA [w: 1]		
Workload:	The workload is 90h. It is the result of 30h attendance and 60h self-		

	studies.

Data:	INSTAE. MA. Nr. 3621 / Examination number: 42809	Version: 20.09.2017	Start Year: WiSe 2019
Module Name:	**Maintenance Engineering**		
(English):			
Responsible:	Lieberwirth, Holger / Prof. Dr.-Ing.		
Lecturer(s):			
Institute(s):	Institute of Mineral Processing Machines		
Duration:	1 Semester(s)		
Competencies:	The students shall be enabled to understand maintenance as a complex of technical, technological, organizational and economic tasks and to plan the maintenance process within the framework of the production process control, to prepare it technologically and to implement it rationally, taking into account legal requirements.		
Contents:	- Content / Purpose / Tasks / Organization of maintenance - Damage processes, technical diagnostics, renewal processes - Maintenance methods - Planning of maintenance measures - Maintenance organization - Technology of maintenance - Reliability of technical systems - Maintenance-friendly design and configuration - Analysis of weak points of machines and plants		
Literature:	Manzini, R., Regattieri A., Pham, H., Ferrari, E.: Maintenance of Industrial Systems, Springer, 2010 DIN EN 13306:2010-12: Maintenance – Maintenance Terminology, Beuth, 2010		
Types of Teaching:	S1 (WS): Lectures (2 SWS)		
Pre-requisites:			
Frequency:	yearly in the winter semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: MP/KA (KA if 10 students or more) [MP minimum 30 min / KA 90 min]		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: MP/KA (KA bei 10 und mehr Teilnehmern) [MP mindestens 30 min / KA 90 min]		
Credit Points:	3		
Grade:	The Grade is generated from the examination result(s) with the following weights (w): MP/KA [w: 1]		
Workload:	The workload is 90h. It is the result of 30h attendance and 60h self-studies. The latter includes the preparation and follow-up of the lectures as well as preparation for the examination.		

Data:	MIH MA Nr. / Examination number: 60410	Version: 15.07.2016	Start Year: SoSe 2017
Module Name:	**Marketing**		
(English):	Marketing		
Responsible:	Enke, Margit / Prof. Dr.		
Lecturer(s):	Enke, Margit / Prof. Dr.		
Institute(s):	Professor of Marketing and International Trade		
Duration:	1 Semester(s)		
Competencies:	Gaining theoretical and practical knowledge about key issues of marketing as market-oriented management and applying this knowledge to practical examples. Students should be able to analyse and evaluate the company situation, the competitive environment and the customers of a company and to utilize the findings for developing marketing strategies.		
Contents:	Marketing (marketing definition and marketing concept, customers of a company, competitors of a company, the company, instruments of a company: the marketing mix).		
Literature:	Homburg, Ch., Kuester, S., & Krohmer, H. (2009): Marketing Management: A Contemporary Perspective, Berkshire, McGraw-Hill. Kotler, Ph. & Armstrong, G. (2009): Principles of Marketing, 13th ed., Prentice Hall, Pearson.		
Types of Teaching:	Incl. Practice Excerises / Lectures (2 SWS)		
Pre-requisites:			
Frequency:	yearly in the summer semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: KA [90 min]		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: KA [90 min]		
Credit Points:	3		
Grade:	The Grade is generated from the examination result(s) with the following weights (w): KA [w: 1]		
Workload:	The workload is 90h. It is the result of 30h attendance and 60h self-studies.		

Data:	MATMPE. MA. Nr. 3624 / Examination number: -	Version: 15.11.2017	Start Year: SoSe 2020
Module Name:	**Master Thesis (Mechanical and Process Engineering)**		
(English):			
Responsible:	Peuker, Urs Alexander / Prof. Dr.-Ing.		
Lecturer(s):			
Institute(s):	Institute of Mechanical Process Engineering and Mineral Processing		
Duration:	22 Week(s)		
Competencies:	The students should get the ability to solve scientific tasks in the field of mechanical and process engineering. They should be able to prepare a scientific presentation of their own scientific work and defend it in front of an audience. Economic aspects and impacts also should be considered in the work. The thesis can be written in any institute at the university which provided an obligate lecture in the course program mechanical and process engineering. The master thesis is the examination which completes the entire course. The work is the proof that the students are able to solve technological or scientific problems by their own using the scientific tools they acquired during their bachelor and master education. The proof comprises: • Writing of a scientific report (master thesis) ◦ Review of relevant scientific literature and connection to the own topic ◦ Sound presentation of applied methods ◦ Presentation and scientific discussion of own results (e.g. experimental data, modelling results) ◦ Conclusion and summary of own work • Compiling of a scientific presentation to communicate selected results and methods of the report to a scientific audience.		
Contents:	Concept of the work schedule; analysis of literature; familiarize with methods, testing equipment, numerical methods; conduction and analysis of tests in situ and in the laboratory; implementation of calculations and numerical simulations; summary, scientific analysis and generalization of the results (period of six months).		
Literature:	Guideline for the preparation of scientific works at TU Bergakademie Freiberg from 27.06.2005, DIN 1422, part 4 (08/1985); Hints for taskspecific literature will be given.		
Types of Teaching:	S1: Thesis / Thesis (22 Wo)		
Pre-requisites:	**Mandatory:** Siehe § 19 Absatz 3 Satz 6 PO.		
Frequency:	constantly		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: AP*: Master Thesis AP*: Colloquium * In modules requiring more than one exam, this exam has to be passed or completed with at least "ausreichend" (4,0), respectively.		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: AP*: Masterarbeit AP*: Kolloquium * Bei Modulen mit mehreren Prüfungsleistungen muss diese		

	Prüfungsleistung bestanden bzw. mit mindestens "ausreichend" (4,0) bewertet sein.
Credit Points:	30
Grade:	The Grade is generated from the examination result(s) with the following weights (w): AP*: Master Thesis [w: 4] AP*: Colloquium [w: 1] * In modules requiring more than one exam, this exam has to be passed or completed with at least "ausreichend" (4,0), respectively.
Workload:	The workload is 900h.

Data:	FÖTEE. MA. Nr. 3625 / Examination number: 44402	Version: 19.09.2017	Start Year: SoSe 2019
Module Name:	**Materials Handling**		
(English):			
Responsible:	Mütze, Thomas / Dr.-Ing. Lieberwirth, Holger / Prof. Dr.-Ing.		
Lecturer(s):			
Institute(s):	Institute of Mechanical Process Engineering and Mineral Processing Institute of Mineral Processing Machines		
Duration:	1 Semester(s)		
Competencies:	Starting out from the methods of material characterization and the fundamentals of the different processes, the students acquire competences regarding the possibilities of various conveying techniques (pneumatic, hydraulic, mechanical conveying), the associated machines / apparatuses and the calculation and design of selected conveyors and conveying systems for mineral, renewable raw materials and waste.		
Contents:	Possibilities and methods of bulk material characterization, process basics, classification, calculation and design of selected conveyors (pneumatic, hydraulic, mechanical) as well as design of conveyor systems (for example in the processing of primary and secondary raw materials as well as waste).		
Literature:	Wolfgang Beitz, B.J. Davies, Karl-Heinz Küttner, Heinrich Dubbel, DUBBEL - Handbook of Mechanical Engineering (Englisch) – 28. September 1994 Scheffler, M.: Mechanische Fördermittel und ihre Anwendung für Transport, Umschlag und Lagerung), VEB Fachbuchverlag Leipzig 1984		
Types of Teaching:	S1 (SS): Lectures (2 SWS) S1 (SS): Practical exercises and one design exercise / Exercises (1 SWS)		
Pre-requisites:			
Frequency:	yearly in the summer semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: MP/KA (KA if 10 students or more) [MP minimum 30 min / KA 90 min] PVL: At least 90% of the practical exercises are passed successfully. PVL have to be satisfied before the examination.		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: MP/KA (KA bei 10 und mehr Teilnehmern) [MP mindestens 30 min / KA 90 min] PVL: Mindestens 90% der Praktika und der Übungen erfolgreich absolviert. PVL müssen vor Prüfungsantritt erfüllt sein bzw. nachgewiesen werden.		
Credit Points:	4		
Grade:	The Grade is generated from the examination result(s) with the following weights (w): MP/KA [w: 1]		
Workload:	The workload is 120h. It is the result of 45h attendance and 75h self-studies. The work load is 120h. It is the result of 60h attendance and 60h self-studies. The latter includes the preparation for exercises, practical trainings, and preparation for the exam.		

Data:	MINLI. BA.HPT.Nr / Examination number: 33208	Version: 14.07.2016	Start Year: WiSe 2016
Module Name:	**Mineral Liberation Analysis (MLA) of Mineral Resources**		
(English):			
Responsible:	Schulz, Bernhard / Prof. Dr.		
Lecturer(s):			
Institute(s):	Institute of Mineralogy		
Duration:	1 Semester(s)		
Competencies:	Bewertung von Erzen und Aufbereitungsprodukten aus der automatisierten Liberierungsanalyse (Mineral Liberation Analysis, MLA) mit Rasterelektronenmikroskop (REM). Aufsetzen und Spezifizierung von automatisierten Messungen mit REM. Numerische und graphische Auswertung von Datenbank-Files der automatisierten Analysen mit REM. Evaluation of metal ores and processed metal ores by automated mineral liberation analysis (MLA) by Scanning Electron Microscope (SEM). Set-up and speciation of automated measurements by SEM. Numerical and graphical assessment of databas files produced from automated SEM measurements.		
Contents:	Methodik der automatisierten REM-Analyse, Auswerte-Programme, Daten-Extraktion, Interpretation, Verfassen von Berichten an Aufbereitungsingenieure. Methods of automated SEM analysis, evaluation software, data extraction, interpretation, writing of reports for mineral processing engineers.		
Literature:	Gu, Y. (2003). Automated Scanning Electron Microscope Based Mineral Liberation Analysis. Journal of Minerals and Materials Characterization & Engineering, vol. 2, no. 1: 33–41.; Fandrich, R., Gu, Y., Burrows, D. & Moeller, K. (2007). Modern SEM-based mineral liberation analysis. International Journal of Mineral Processing, 84, 310-320.		
Types of Teaching:	S1 (WS): Mineral Liberation Analysis (MLA) of Mineral Resources - Präsentation von Verfahren der automatisierten Mineral Liberation Analysis (MLA) mit Rasterelektronenmikroskop. Teilnehmer bearbeiten Daten mit eigenen Laptops.Presentation of methods of Mineral Liberation Analysis (MLA) by Scanning Electron Microscope (SEM). Participants evaluate data by using their own Laptops. / Exercises (2 SWS)		
Pre-requisites:	**Recommendations:** Knowledge of analytical methods based on electron beam intruments		
Frequency:	yearly in the winter semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: AP: Report with protocol on the evaluation of a Mineral Liberation Analysis by Scanning Electron Microscope (SEM)		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: AP: Abgabe eines Berichts mit Protokoll über die Auswertung einer Mineral Liberation Analyse mit Rasterelektronenmikroskop (REM)		
Credit Points:	3		
Grade:	The Grade is generated from the examination result(s) with the following weights (w): AP: Report with protocol on the evaluation of a Mineral Liberation		

	Analysis by Scanning Electron Microscope (SEM) [w: 1]
Workload:	The workload is 90h. It is the result of 30h attendance and 60h self-studies. Der Zeitaufwand beträgt 60 h und setzt sich zusammen aus 30 h Präsenzzeit und 30 h Selbststudium. Letzteres umfasst die Anfertigung des Berichts mit Protokoll.Expenditure of time is 60 hrs. This is composed of 30 hrs presence in class and 30 hrs homework, including preparation of report with protocol.

Data:	OPMAN. MA. Nr. 2970 / Examination number: 61304	Version: 06.07.2015	Start Year: WiSe 2016
Module Name:	**Operations Management**		
(English):			
Responsible:	Höck, Michael / Prof. Dr.		
Lecturer(s):	Höck, Michael / Prof. Dr.		
Institute(s):	Professor of Industrial Management, Production Management and Logistics		
Duration:	1 Semester(s)		
Competencies:	Foremost, the module aims to convey to the student problem-solving competencies with a view to putting the student in a position to analyse the complex questions in operations management, to structure them, and to develop solution alternatives.		
Contents:	This course addresses the management of operations in manufacturing and service firms. Diverse activities, such as determining the size and type of production process, purchasing the appropriate raw materials, planning and scheduling the flow of materials and the nature and content of inventories, assuring product quality, and deciding on the production hardware and how it gets used, comprise this function of the company. Managing operations well requires both strategic and tactical skills. During the term, we will consider such topics as: process analysis, workforce issues, materials management, quality and productivity, technology, and strategic planning, together with relevant analytical techniques. This course will provide a survey of these issues.		
Literature:	Davis, M. & Heineke, J. (2005): Operations Management, 5/e, McGraw-Hill Cachon & Terwiesch (2006): Matching Supply and Demand, McGraw-Hill Stevenson (2007): Operations Management, 9/e, McGraw-Hill.		
Types of Teaching:	S1 (WS): Lectures (2 SWS) S1 (WS): Exercises (2 SWS)		
Pre-requisites:	**Recommendations:** None		
Frequency:	yearly in the winter semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: KA [90 min] PVL: Case Studies PVL have to be satisfied before the examination.		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: KA [90 min] PVL: Fallstudien PVL müssen vor Prüfungsantritt erfüllt sein bzw. nachgewiesen werden.		
Credit Points:	6		
Grade:	The Grade is generated from the examination result(s) with the following weights (w): KA [w: 1]		
Workload:	The workload is 180h. It is the result of 60h attendance and 120h self-studies. Self-study consists of preparation and review of the lectures, independent work on case studies, as well as preparation for the written test.		

Data:	PLANTDS. MA. Nr. 3623 / Examination number: 40416	Version: 22.09.2017	Start Year: WiSe 2018
Module Name:	**Plant Design**		
(English):			
Responsible:	Meyer, Bernd / Prof. Dr.-Ing.		
Lecturer(s):	Meyer, Bernd / Prof. Dr.-Ing.		
Institute(s):	Institute of Energy Process Engineering and Chemical Engineering		
Duration:	1 Semester(s)		
Competencies:	This course aims to impart the relevant basic knowledge for planning and design of process plants. Major objectives of the course are to understand planning processes and different kinds of project organization. The students will be enabled to determine and to apply basic conditions of investment calculations, and to read and to create piping & instrumentation diagrams (P&ID). Furthermore, students will get to know design criteria of different plant components, and gain expertise to apply these criteria for dimensioning of pipes, vessels, reactors etc.		
Contents:	Kinds/contents of project phases and project organizations, interests of customers/vendors, contracts, estimation of investment costs and rating of investments, symbols for P&ID, creation of process flow diagrams, dimensioning of plant components based on technical standards.		
Literature:	In-house teaching material; E.B. Nauman: „Chemical Reactor Design, Optimization and Scaleup“, McGraw-Hill; S.M. Walas: „Chemical Process Equipment Selection and Design“, Butterworth-Heinemann.		
Types of Teaching:	S1 (WS): Lectures (2 SWS) S1 (WS): Exercises (1 SWS)		
Pre-requisites:	**Recommendations:** Knowledge in process and systems engineering		
Frequency:	yearly in the winter semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: KA [120 min]		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: KA [120 min]		
Credit Points:	4		
Grade:	The Grade is generated from the examination result(s) with the following weights (w): KA [w: 1]		
Workload:	The workload is 120h. It is the result of 45h attendance and 75h self-studies.		

Data:	PET. MA. Nr. 3361 / Examination number: 62401	Version: 14.07.2016	Start Year: SoSe 2016
Module Name:	**Plant Economics and Technology**		
(English):			
Responsible:	Fröhling, Magnus / Prof.		
Lecturer(s):	Fröhling, Magnus / Prof.		
Institute(s):	Professor of Ressourcemanagement		
Duration:	1 Semester(s)		
Competencies:	The students are enabled to understand the techno-economic issues associated with the life cycle of industrial plants. This comprises also linked topics of technology assessment and management. After completion of this module the students are able to characterise plant economic tasks and apply exemplary methods to fulfil these. They discuss the achievements and shortcomings of these methods for a practical application. They are able to transfer these contents to an application in practice.		
Contents:	• Introduction to Plant Economics and Technology • Life cycle of industrial plants • Analysis and modelling of industrial production systems • Project management in engineering • Network and facility location planning • Process design • Investment estimation • Cost estimation • Plant and process optimisation • Maintenance and repair • Quality Management • Re-location, dismantling and recycling • Technology assessment and management		
Literature:	Recommended reading: 1. Peters/Timmmerhaus/West (2003): Plant Design and Economic for Chemical Engineers, McGrawHill 2. Chauvel (2003): Manual of Process Economic Evaluation, Edition Technip 3. Couper (2003): Process engineering economics, Marcel Dekker Inc Further literature recommendations will be given in the lecture.		
Types of Teaching:	S1 (SS): Plant Economics and Technology / Lectures (2 SWS) S1 (SS): Plant Economics and Technology / Lectures (2 SWS)		
Pre-requisites:			
Frequency:	yearly in the summer semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: PVL: Assignments KA [90 min] PVL have to be satisfied before the examination.		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: PVL: Aufgaben KA [90 min] PVL müssen vor Prüfungsantritt erfüllt sein bzw. nachgewiesen werden.		
Credit Points:	6		

Grade:	The Grade is generated from the examination result(s) with the following weights (w): KA [w: 1]
Workload:	The workload is 180h. It is the result of 60h attendance and 120h self-studies.

Data:	Examination number: -	Version: 18.01.2019	Start Year: WiSe 2019
Module Name:	**Practice of Secondary Raw Materials**		
(English):	Practice of Secondary Raw Materials		
Responsible:	Peuker, Urs Alexander / Prof. Dr.-Ing.		
Lecturer(s):	Mitarbeiter des Institutes MVT/AT Peuker, Urs Alexander / Prof. Dr.-Ing.		
Institute(s):	Institute of Mechanical Process Engineering and Mineral Processing		
Duration:	1 Semester(s)		
Competencies:	The students acquire knowledge about typical actual challenges as well as about technical setups and approaches in recycling industry. They are able to connect theoretical knowledge on unit operations to the technical operation of recycling plants. Furthermore the students become familiar with the balancing and business models in secondary raw materials business.		
Contents:	The aim is the teaching of practical insight into secondary raw materials technology and its industrial application. Several established processes for secondary raw materials are introduced by (guest) lectures. This introduction contains the specialties of the material sources and properties, the process design and potential alternatives as well as the key technological components. The lecture also involves demonstration of technology by site visits of recycling plants. (guest) lectures: introduction in several recycling processes, e.g. battery recycling (acid lead battery, lithium-ion battery), aluminium scrap, construction waste, metallurgical waste, WEEE, automotive recycling.		
Literature:	Martens, H. und Goldmann, D.: Recyclingtechnik Scientific publications		
Types of Teaching:	S1 (WS): Lectures (1 SWS) S1 (WS): Seminar (1 SWS) S1 (WS): 4-6 Site visits to relevant production plants connected to course content / Excursion (3 SWS)		
Pre-requisites:	**Mandatory:** course restricted to students of EMerald program		
Frequency:	yearly in the winter semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: AP: Report		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: AP: Bericht		
Credit Points:	4		
Grade:	The Grade is generated from the examination result(s) with the following weights (w): AP: Report [w: 1]		
Workload:	The workload is 120h. It is the result of 75h attendance and 45h self-studies.		

Data:	PPDMPR. MA. Nr. 3620 / Examination number: 40318	Version: 15.11.2017	Start Year: WiSe 2019
Module Name:	**Project - Process Design Mineral Processing / Recycling**		
(English):			
Responsible:	Peuker, Urs Alexander / Prof. Dr.-Ing.		
Lecturer(s):	Mitarbeiter des Institutes MVT/AT		
Institute(s):	Institute of Mechanical Process Engineering and Mineral Processing		
Duration:	1 Semester(s)		
Competencies:	The project work aims at the dimensioning of a mineral processing plant. On the basis of lab scale test (e.g. Bond grindability) the students work out a basic engineering of a processing plant of a given ore type / recycling question. The students learn to select the right lab scale tests, which provide the material and process data to quantify the individual processing steps. They learn the balancing of the material flows as well as of the auxiliary streams (e.g. process water).		
Contents:	Seminar: • Introduction into basic engineering • Plant layout • Example of a case study • Selection of lab scale tests / using standard parameters (e.g. VDI guidelines) • Documentation Project: • Selection of lab tests • Lab work: determination of individual parameters • Definition of interface between process steps • Selection of apparatus / dimensioning of process step • Presentation of flow sheet.		
Literature:	Selected papers and textbook chapters for individual project topic (to be announced in the first week) VDI guidelines and international standards		
Types of Teaching:	S1 (WS): process design mineral processing / recycling / Seminar (2 SWS) S1 (WS): project process design mineral processing / recycling / Practical Application (8 SWS)		
Pre-requisites:	**Recommendations:** Conception of Process Equipment, 2017-08-21 Training in Particle Technology, 2017-08-21		
Frequency:	yearly in the winter semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: AP*: Report (basic Engineering - process layout and applied engineering tools) AP*: Presentation (determination of key parameters using engineering tools) AP*: Presentation (process layout) * In modules requiring more than one exam, this exam has to be passed or completed with at least "ausreichend" (4,0), respectively.		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst:		

	AP*: Bericht (Protokoll der genutzten ingenieurtechnischen Methoden) AP*: Präsentation (Bestimmung von auslegungsrelevanten Prozessparametern) AP*: Präsentation (Prozessauslegung) * Bei Modulen mit mehreren Prüfungsleistungen muss diese Prüfungsleistung bestanden bzw. mit mindestens "ausreichend" (4,0) bewertet sein.
Credit Points:	8
Grade:	The Grade is generated from the examination result(s) with the following weights (w): AP*: Report (basic Engineering - process layout and applied engineering tools) [w: 2] AP*: Presentation (determination of key parameters using engineering tools) [w: 1] AP*: Presentation (process layout) [w: 1] * In modules requiring more than one exam, this exam has to be passed or completed with at least "ausreichend" (4,0), respectively.
Workload:	The workload is 240h. It is the result of 150h attendance and 90h self-studies.

Data:	OMIS. MA. Nr. 3202 / Examination number: 62101	Version: 11.01.2017	Start Year: WiSe 2010
Module Name:	**Project Management**		
(English):			
Responsible:	Jacob, Dieter / Prof. Dr.		
Lecturer(s):	Müller, Clemens / Master		
Institute(s):	Professor of Construction Management		
Duration:	1 Semester(s)		
Competencies:	Students obtain an understanding of the concept of project management and become familiar with important tasks in relation to the management of projects.		
Contents:	This course presents the principles and techniques of managing projects, primarily engineering projects, from the owner's feasibility study through design and development to completion. It emphasises project management during the early stages of project development because it is at that point that the ability to influence the quality, cost and time of a project is at its highest. It includes project scope definition, development of work plan, planning and scheduling, procurement strategies and highlights the management of the three basic components of a project: quality/scope, budget/cost and time/schedule. A simulation exercise is included to demonstrate working in a group and highlight the importance of communication against a backdrop of determining procurement strategy.		
Literature:	• Schelle, Heinz/ Ottmann, Roland/ Pfeiffer, Astrid: Project Manager. German Association for Project Management (GPM), Member of the International Project Management Association (IPMA), 2006. • Kerzner, Harold: Project Management – A Systems Approach to Planning, Scheduling, and Controlling, associated with the Project Management Institute (PMI), 11th Ed, 2013. • The Chartered Institute of Building – Project Management for Construction and Development, 2014. • Klee, Lukas: International Construction Contract Law, 1st Ed, 2014. • Peter W.G. Morris/ George H. Hough – The Anatomy of Major Projects: A Study of the Reality of Project Management. London, 1987. • Merrow, Edward W. – Industrial Megaprojects: Concepts, Strategies, and Practices for Success. New Jersey, 2011. • Köchendörfer, Bernd; Liebchen, Jens; Viering, Markus G.: Bau-Projektmanagement: Grundlagen und Vorgehensweisen, 4th Ed, 2010. • Berner, Fritz; Kochendörfer, Bernd; Schach, Rainer: Grundlagen der Baubetriebslehre 2 – Baubetriebsplanung, 2nd Ed, 2014 • Uher, Thomas; Adam, Zantis; Zantis: Programming and Scheduling Techniques, 2nd Ed, 2011. • Vanhoucke, Mario: Project Management with Dynamic Scheduling – Baseline Scheduling, Risk Analysis and Project Control, 2nd Ed, 2013. • Jacob, Dieter; Müller, Clemens: Estimating in Heavy Construction: Roads, Bridges, Tunnels, Foundations, 1st Ed, 2016.		
Types of Teaching:	S1 (WS): Exercises (1 SWS) S1 (WS): Lectures (1 SWS)		
Pre-requisites:	**Recommendations:**		

	No pre-requisites are required.
Frequency:	yearly in the winter semester
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: KA [90 min]
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: KA [90 min]
Credit Points:	3
Grade:	The Grade is generated from the examination result(s) with the following weights (w): KA [w: 1]
Workload:	The workload is 90h. It is the result of 30h attendance and 60h self-studies.

Data:	PWMPE. MA. Nr. 3618 / Examination number: 40317	Version: 21.09.2017	Start Year: SoSe 2019
Module Name:	**Project Work (Mechanical and Process Engineering)**		
(English):			
Responsible:	Peuker, Urs Alexander / Prof. Dr.-Ing.		
Lecturer(s):			
Institute(s):	Institute of Mechanical Process Engineering and Mineral Processing		
Duration:	22 Week(s)		
Competencies:	The Students develop their ability to work in teams. In particular, they gain competencies in structuring of a task, scheduling, coordination of the divided task processing, and presentation skills.		
Contents:	The project work includes the processing of a task with regard to research, development and analysis of problems in close cooperation with the institutions involved and /or in cooperation with other research institutions, industry or authorities. Project work should be processed course-related and in small teams of 3 to 5 students. A joint report should be prepared, where all the persons in charge and their part of work are identified.		
Literature:	Depending on the selected theme. Further literature can be recommended by the supervisor.		
Types of Teaching:	S1 (SS): Instruction, consultations workshops, self-studies, presentations, discussion. / project (22 Wo)		
Pre-requisites:			
Frequency:	yearly in the summer semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: AP: Project report AP: Presentation		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: AP: Bericht AP: Präsentation		
Credit Points:	11		
Grade:	The Grade is generated from the examination result(s) with the following weights (w): AP: Project report [w: 2] AP: Presentation [w: 1]		
Workload:	The workload is 330h.		

Data:	RESMGT. MA. Nr. 2082 / Examination number: 62407	Version: 19.08.2016	Start Year: WiSe 2016
Module Name:	**Resource Management**		
(English):			
Responsible:	Fröhling, Magnus / Prof.		
Lecturer(s):	Fröhling, Magnus / Prof.		
Institute(s):	Professor of Ressourcemanagement		
Duration:	1 Semester(s)		
Competencies:	Students • explain the resource related corporate management tasks, structure these, • use selected tools and methods and • explain the interplay between resource management and related tasks such as operations and supply chain management.		
Contents:	The course deals with the field of resource management from a industrial perspective. This comprises resource related management tasks, methods and tools to solve these and how they are embedded within functions and processes of companies. Thereby the focus lies on repetition factors mineral raw materials and energy carriers, renewable raw materials and energy carriers as well as secondary raw materials and energy carriers.		
Literature:	• Bausch (2009): Handbook Utility Management, Springer • Thiede (2012): Energy Efficiency in Manufacturing Systems, Springer • Thonemann (2015): Operations Management, Pearson • Vrat (2014): Materials Management, Springer • Wagner, Enzler (2006) Material Flow Management, Physica		
Types of Teaching:	S1 (WS): Lectures (2 SWS) S1 (WS): Exercises (2 SWS)		
Pre-requisites:			
Frequency:	yearly in the winter semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: AP*: Assignment KA* [90 min] * In modules requiring more than one exam, this exam has to be passed or completed with at least "ausreichend" (4,0), respectively.		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: AP*: Aufgabe KA* [90 min] * Bei Modulen mit mehreren Prüfungsleistungen muss diese Prüfungsleistung bestanden bzw. mit mindestens "ausreichend" (4,0) bewertet sein.		
Credit Points:	6		
Grade:	The Grade is generated from the examination result(s) with the following weights (w): AP*: Assignment [w: 1] KA* [w: 5] * In modules requiring more than one exam, this exam has to be passed		

	or completed with at least "ausreichend" (4,0), respectively.
Workload:	The workload is 180h. It is the result of 60h attendance and 120h self-studies.

Data:	SSSE. MA. Nr. 3653 / Examination number: 43112	Version: 24.09.2018	Start Year: WiSe 2018
Module Name:	**Selective Separation of Strategic Elements**		
(English):			
Responsible:	Bräuer, Andreas / Prof. Dr.-Ing.		
Lecturer(s):	Haseneder, Roland / Dr. rer. nat.		
Institute(s):	Institute of Thermal, Environmental and Natural Products Process Engineering		
Duration:	1 Semester(s)		
Competencies:	On completion of the course the student shall be able to explain membrane technology and the different applications like extraction and membrane assisted processes regarding the separation of value products. Focus is put on strategic elements. They can use their physico-chemical knowledge on membrane separation, development of hybrid operation systems and the influences for practical applications and are familiar with the methods and problems related to separation devices. Due to the seminar the students will be able to dicuss the current literature on the topic.		
Contents:	• membranes, modules, hybrid processes • driving forces, transport resistances • structures, materials • mass transfer • module construction • MF, UF, NF, RO • standard applications • scaling, fouling effects • special applications: mine water treatment, leaching solutions, resourcerecovery • internship to membrane processes		
Literature:	Heinrich Strathmann: Introduction to Membrane Science and Technology, Wiley-VCH, 2011 Anil K. Pabby, Syed S.H. Rizvi, Ana Maria Sastre Requena: Handbook of Membrane Separations, CRC-Press 2008		
Types of Teaching:	S1 (WS): Lectures (2 SWS) S1 (WS): Seminar (1 SWS) S1 (WS): Practical Application (1 SWS)		
Pre-requisites:			
Frequency:	yearly in the winter semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: KA [90 min]		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: KA [90 min]		
Credit Points:	5		
Grade:	The Grade is generated from the examination result(s) with the following weights (w): KA [w: 1]		
Workload:	The workload is 150h. It is the result of 60h attendance and 90h self-studies.		

Data:	SSMP MA. / Examination number: 51119	Version: 13.11.2018	Start Year: SoSe 2019
Module Name:	**Simulation of Sustainable Metallurgical Process**		
(English):			
Responsible:	Stelter, Michael / Prof. Dr.-Ing. Reuter, Markus / Prof. Dr.		
Lecturer(s):	Reuter, Markus / Prof. Dr.		
Institute(s):	Institute for Nonferrous Metallurgy and Purest Materials		
Duration:	1 Semester(s)		
Competencies:	1. Simulation of reactor types • modelling and simulation of hydro- and pyrometallurgical reactors for primary and secondary resources and determination of mass and energy balances as well as minerals processing • determination of ecological and economic footprint of reactors 2. Modelling of processing flowsheets • develop processing flowsheets for non-ferrous metal containing resources • modelling and simulation of hydro- and pyrometallurgical processing plants for primary and secondary non-ferrous resources as well as minerals processing • determination of mass and energy balances of the complete flowsheet and determine optimal processing routes • determination of ecological and economic footprint of complete flowsheets 3. Methods and tools • use of simulation tools such as HSC Sim 9.0, FACTSAGE etc. and environmental software tools such as GaBi to evaluate different processing options • create process designs and communicate results to a client and/or stakeholders e.g. NGOs		
Contents:	Reactor types in process metallurgy and minerals processing (e.g. TSL, Kaldo, flash smelting, QSL, flotation cells etc.) will be compared using simulation cases, evaluated and optimised for metal and minor metal recovery. The environmental footprint as also the economic performance of each reactor type will be compared with each other to establish best options for reactor flotation types as a function of feed types. The student will understand minerals processing and metallurgical reactor technology better and also be in a better position to create more sustainable industry and society. Process design cases will be performed by the students to optimally process different feed types. By using a wider range of reactor types the student will be able to simulate complete flowsheets, provide mass and energy balances at the same time also determine the environmental footprint as well as economic analysis. This course will also examine the impact of product design on the recycling of various end-of-life products such as mobile phones etc. Thus, not only will natural resources be processed in the simulated systems but also materials from the “urban mine”. Therefore, this course will also use this rigorous simulation basis to critically discuss environmental legislation as well as communicate		

	these results to all stakeholders. The course takes place as a 2 week block course in September.
Literature:	• E. Worrell, M.A. Reuter (2014): Handbook of Recycling, Elsevier BV, Amsterdam, 595p. (ISBN 978-0-12-396459-5). • M.A. Reuter, R. Matusewicz, A. van Schaik (2015): Lead, Zinc and their Minor Elements: Enablers of a Circular Economy World of Metallurgy – ERZMETALL 68 (3), 132-146. • M.A. Reuter, A. van Schaik, J. Gediga (2015): Simulation-based design for resource efficiency of metal production and recycling systems, Cases: Copper production and recycling, eWaste (LED Lamps), Nickel pig iron, International Journal of Life Cycle Assessment, 20(5), 671-693. • M.A. Reuter, I. Kojo (2014): Copper: A Key Enabler of Resource Efficiency, World of Metallurgy – ERZMETALL 67 (1), 46-53 (Summary of plenary lecture Copper 2013). • S. Creedy, A. Glinin, R. Matusewicz, S. Hughes, M.A. Reuter (2013): Outotec® Ausmelt Technology for Treating Zinc Residues, World of Metallurgy – ERZMETALL, 66(4), 230-235. • M.A.H. Shuva, M.A. Rhamdhani, G. Brooks, S. Masood, M.A. Reuter (2016): Thermodynamics data of valuable elements relevant to e-waste processing through primary and secondary copper production - a review, J. Cleaner Production, 131, 795-809. • M.A. Reuter (2016): Digitalizing the Circular Economy - Circular Economy Engineering defined by the metallurgical Internet of Things-, 2016 TMS EPD Distinguished Lecture, USA, Metallurgical Transactions B, 47(6), 3194-3220 (http://link.springer.com/article/10.1007/s11663-016-0735-5). • I. Rönnlund, M.A. Reuter, S. Horn, J. Aho, M. Päällysaho, L. Ylimäki, T. Pursula (2016): Sustainability indicator framework implemented in the metallurgical industry: Part 1-A comprehensive view and benchmark & Implementation of sustainability indicator framework in the metallurgical industry: Part 2-A case study from the copper industry, International Journal of Life Cycle Assessment, 21(10), 1473-1500 & 21(12), 1719-1748.
Types of Teaching:	S1 (SS): Block course / Lectures (1 SWS) S1 (SS): Block course / Seminar (2 SWS) S1 (SS): Block course / Practical Application (2 SWS)
Pre-requisites:	**Recommendations:** Basic thermodynamic, thermodynamic and kinetic knowledge in process metallurgy
Frequency:	yearly in the summer semester
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: AP: Report of simulation The student should solve a case/example and hand in the computer file as a document.
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: AP: Simulationsbeleg Der Student soll einen Fall/Beispiel lösen und die Computerdatei als Dokument einreichen.
Credit Points:	6

Grade:	The Grade is generated from the examination result(s) with the following weights (w): AP: Report of simulation [w: 1]
Workload:	The workload is 180h. It is the result of 75h attendance and 105h self-studies.

Data:	SE. MA. Nr. 3622 / Examination number: 41611	Version: 01.03.2017	Start Year: WiSe 2019
Module Name:	**Sustainable Engineering**		
(English):			
Responsible:	Kröger, Matthias / Prof. Dr.		
Lecturer(s):	Kröger, Matthias / Prof. Dr.		
Institute(s):	Institute for Machine Elements, Engineering Design and Manufacturing		
Duration:	1 Semester(s)		
Competencies:	The students are able to analyze the sustainability of developed machines based on life-time analyses. The students can design machines considering criteria for sustainable design, production and use of machines.		
Contents:	The module focuses on the following topics: • Analyses of product life cycle and carbon footprint • Assessment of machine design in respect to environmental impact, resource and energy consumption • Design for reuse and recycling of machines and components • Repair-friendly and durable engineering design • Machine design for the Third World • Examples of sustainable and not sustainable system design		
Literature:	Brundtland Report 1987. https://en.wikisource.org/wiki/Brundtland_Report		
Types of Teaching:	S1 (WS): Lectures (1 SWS) S1 (WS): Exercises (2 SWS)		
Pre-requisites:	**Recommendations:** Maschinen- und Apparateelemente, 2017-05-19 Konstruktionslehre, 2009-05-01 Design of Machine Elements or Components of Machine and Apparatures		
Frequency:	yearly in the winter semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: MP [30 min]		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: MP [30 min]		
Credit Points:	4		
Grade:	The Grade is generated from the examination result(s) with the following weights (w): MP [w: 1]		
Workload:	The workload is 120h. It is the result of 45h attendance and 75h self-studies.		

Data:	THT. MA. Nr. / Examination number: 41215	Version: 29.08.2017	Start Year: WiSe 2018
Module Name:	**Thermodynamics and Heat Transfer**		
(English):			
Responsible:	Fieback, Tobias / Prof. Dr. Ing.		
Lecturer(s):	Fieback, Tobias / Prof. Dr. Ing.		
Institute(s):	Institute of Thermal Engineering		
Duration:	1 Semester(s)		
Competencies:	- knowledge of basic thermodynamic principles - appyling of those principles to beginner level thermodynamic processes - getting a brief understanding of heat and mass transfer processes		
Contents:	- Fundamentals of thermodynamics (equations of state, reversible processes, system boundaries) - First and second law of thermodynamics - Thermodynamic properties of pure fluid substances - Thermodynamic investigation of cycle processes (carnot, clausius-rankine, ...) - Thermodynamics of simple mixtures (humid air) - Basic introductions to heat and mass transfer processes		
Literature:	- The Laws of Thermodynamics: A Very Short Introduction; Peter W. Atkins (just for getting started) - Thermodynamik: Grundlagen und technische Anwendungen; H.D. Baehr / S. Kabelac (German) - VDI-Wärmeatlas (Thermodynamic Properties in German)		
Types of Teaching:	S1 (WS): Lecture / Lectures (1 SWS) S1 (WS): Exercise / Exercises (2 SWS)		
Pre-requisites:			
Frequency:	yearly in the winter semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: MP/KA (KA if 10 students or more) [MP minimum 40 min / KA 120 min]		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: MP/KA (KA bei 10 und mehr Teilnehmern) [MP mindestens 40 min / KA 120 min]		
Credit Points:	4		
Grade:	The Grade is generated from the examination result(s) with the following weights (w): MP/KA [w: 1]		
Workload:	The workload is 120h. It is the result of 45h attendance and 75h self-studies.		

Data:	TED MA. Nr. / Examination number: 41510	Version: 01.03.2017	Start Year: WiSe 2018
Module Name:	**Training in Endurance and Design**		
(English):			
Responsible:	Kröger, Matthias / Prof. Dr.		
Lecturer(s):	Kröger, Matthias / Prof. Dr. Szlosarek, Robert / Dr.		
Institute(s):	Institute for Machine Elements, Engineering Design and Manufacturing		
Duration:	1 Semester(s)		
Competencies:	The students are able to analyze and design machine elements and machines. The students can dimension the main machine elements and can give a prediction of the endurance of these elements.		
Contents:	The module focuses on the following topics: • Introduction in a CAD system • Dimensioning of components for static and cyclic loadings • Load analyzes of measured force or stress data • Design of shaft bearing systems and endurance calculation of bearings • Selection and calculation of screws and screw junctions • Endurance of gears and design of gear boxes • Own design and dimensioning of a bearing system and a gear box		
Literature:	V. B. Bhandari: Design of Machine Elements, Fourth Edition. Mc Graw Hill Education, India (2016).		
Types of Teaching:	S1 (WS): Lectures (1 SWS) S1 (WS): Exercises (2 SWS) S1 (WS): Practical Application (1 SWS)		
Pre-requisites:	**Recommendations:** Basic knowledge in engineering design		
Frequency:	yearly in the winter semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: KA [120 min] PVL: Dimensioning and technical design PVL have to be satisfied before the examination.		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: KA [120 min] PVL: Konstruktionszeichnung und -auslegung PVL müssen vor Prüfungsantritt erfüllt sein bzw. nachgewiesen werden.		
Credit Points:	6		
Grade:	The Grade is generated from the examination result(s) with the following weights (w): KA [w: 1]		
Workload:	The workload is 180h. It is the result of 60h attendance and 120h self-studies.		

Data:	TFD. MA. Nr. / Examination number: 41911	Version: 29.03.2017	Start Year: WiSe 2018
Module Name:	**Training in Fluid Dynamics**		
(English):			
Responsible:	Schwarze, Rüdiger / Prof. Dr.-Ing.		
Lecturer(s):	Schwarze, Rüdiger / Prof. Dr.-Ing. Bauer, Katrin / Dr. Ing. Heinrich, Martin / Dr. Ing.		
Institute(s):	Institute of Mechanics and Fluid Dynamics		
Duration:	1 Semester(s)		
Competencies:	Students shall recapitulate important principles and corresponding fundamental equations of fluid dynamics. They shall learn the ability to apply their knowledge to flow problems of technical importance. Typical solutions strategies for such problems are trained.		
Contents:	A review of the main concepts of fluid dynamics, e.g. streamline flow, laminar and turbulent flow as well as boundary layers are reviewed. The applications of these concepts for the decription and solution of technical flow problems are discussed and trained.		
Literature:	J. F. Douglas et al.: Fluid Mechanics. Harlow: Pearson Education, 2001 M. C. Potter and D. C. Wiggert: Mechanics of Fluids. London: Prentice-Hall, 1997		
Types of Teaching:	S1 (WS): Lectures (1 SWS) S1 (WS): Exercises (2 SWS)		
Pre-requisites:	**Recommendations:** Knowledge in physics for engineers and fundamentals of fluid dynamics		
Frequency:	yearly in the winter semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: KA [45 min]		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: KA [45 min]		
Credit Points:	4		
Grade:	The Grade is generated from the examination result(s) with the following weights (w): KA [w: 1]		
Workload:	The workload is 120h. It is the result of 45h attendance and 75h self-studies.		

Data:	TPT. BA. Nr. / Examination number: 40316	Version: 21.08.2017	Start Year: WiSe 2019
Module Name:	**Training in Particle Technology**		
(English):			
Responsible:	Peuker, Urs Alexander / Prof. Dr.-Ing.		
Lecturer(s):	Mitarbeiter des Institutes MVT/AT Peuker, Urs Alexander / Prof. Dr.-Ing.		
Institute(s):	Institute of Mechanical Process Engineering and Mineral Processing		
Duration:	1 Semester(s)		
Competencies:	The module aims at recalling the fundamentals of particle technology. It is set up using special exercises to practice scientific and technological calculations of particle size distributions and fundamental micro-processes. The principles of the mechanical micro-processes are introduced. The exercises also apply the fundamental approaches (micro-processes) to describe and to design process equipment. This will be done using case studies.		
Contents:	Particle characterization Particle size distribution Mixing of particle size distributions Separation of particle size distributions (classification) Grade recovery curves Micro processes in particle technology • Particles in flow-fields (i.e. sedimentation) • Flow through porous media • Particle-particle interactions (e.g. van-der-Waals-forces, electrostatic interactions, DLVO-theory, capillary forces) • Breakage laws (i.e. breakage energy) Selected case studies form the fields: • Filtration • Sedimentation • Agglomeration • Classification • Comminution • And others		
Literature:	M. Stieß: Mechanische Verfahrenstechnik 1 - Partikeltechnologie, Springer-Verlag, Berlin, Heidelberg, 2009 H. Schubert: Handbuch der Mechanischen Verfahrenstechnik, Wiley-VCH, Weinheim, 2003 selected scientific papers		
Types of Teaching:	S1 (WS): Recall of fundamentals / Lectures (1 SWS) S1 (WS): Application of fundamentals - case studies / Exercises (2 SWS)		
Pre-requisites:			
Frequency:	yearly in the winter semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: MP/KA (KA if 8 students or more) [MP minimum 30 min / KA 120 min]		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: MP/KA (KA bei 8 und mehr Teilnehmern) [MP mindestens 30 min / KA 120 min]		
Credit Points:	4		

Grade:	The Grade is generated from the examination result(s) with the following weights (w): MP/KA [w: 1]
Workload:	The workload is 120h. It is the result of 45h attendance and 75h self-studies.

Freiberg, den 02. Mai 2019

gez.
Prof. Dr. Klaus-Dieter Barbknecht
Rektor

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