Amtliche Bekanntmachungen der TU Bergakademie Freiberg

Nr. 7, Heft 2 vom 18. Mai 2018

Modulhandbuch

für den

Masterstudiengang

Technology and Application of

Inorganic Engineering Materials

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:	CerEng. MA. Nr. / Examination number: 40912	Version: 15.06.2016	Start Year: WiSe 2016
Module Name:	**Ceramic Engineering**		
(English):			
Responsible:	Aneziris, Christos G. / Prof. Dr.-Ing.		
Lecturer(s):	Aneziris, Christos G. / Prof. Dr.-Ing.		
Institute(s):	Institute of Ceramics, Glass and Construction Materials		
Duration:	1 Semester(s)		
Competencies:	Students will understand, apply, improve and generate ceramic materials: • in micro structural design, • ceramic processing, • testing and • application		
Contents:	Most important ingredients are: • definition, bonding, • micro structure, density, porosity • mechanical properties, • thermal and thermo mechanical properties • chemical properties • sintering • basics in ceramic technology, theoretical • ceramic technology pressing/extruding/casting, experimental • engineering ceramics, alumina/zirconia • engineering ceramics, silicon carbide • functional ceramics, non linear dielectric/piezoelectric properties - barium titanate • refractories, carbon bonded materials • silicate ceramics • Exercise: theoretical density / Enthalpy • Visiting of ceramic plant or research institute		
Literature:	Introduction to Ceramics, David Kingery Introduction to the Principles of Ceramic Processing, James Reed Physical Ceramics, Yet-Ming Chiang, Dunbar Birnie III, W. David Kingery		
Types of Teaching:	S1 (WS): Incl. Exercises / Lectures (2 SWS)		
Pre-requisites:	**Recommendations:** Basic fundamentals of materials science		
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 6 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 6 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.		

Data:	DDCBM MA. Nr. / Examination number: -	Version: 15.06.2017	Start Year: WiSe 2019
Module Name:	**Design and Development of Chemically Bonded Materials**		
(English):			
Responsible:	Bier, Thomas A. / Prof. Dr.-Ing.		
Lecturer(s):	Bier, Thomas A. / Prof. Dr.-Ing.		
Institute(s):	Institute of Ceramics, Glass and Construction Materials		
Duration:	1 Semester(s)		
Competencies:	Students will acquire knowledge on chemical bonding reactions such as hydration and the subsequent microstructures for different raw materials. Methods to design experiments to meet defined specifications. They will be able to apply this knowledge in order to: > define a concept thropugh specifications > develop a prototype material > create a data sheet		
Contents:	Methods of DOE Material and Function oriented specifications Functions of binders Functions of additives OPC based mix design Ternary binders OPC-CAC-C$\bar{S}$ Grouting mortars, self levelling underlayments, adhesives Insulating and low density material (porous concrete, AAC) Ultra high strength concrete (MDF, DSP) Self Compacting Concrete - SCC LCC and ULCC Castables		
Literature:			
Types of Teaching:	S1 (WS): Design of CBM / Lectures (2 SWS) S1 (WS): Exercises (1 SWS)		
Pre-requisites:	**Recommendations:** Basic knowledge in Cement Chemistry		
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:	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:	EA MA. Nr. 3581 (for students of TAIM only) / Examination number: -	Version: 16.01.2018	Start Year: WiSe 2019
Module Name:	**Experimental Assignment (Ceramic and Steel Technology)**		
(English):	Experimental Assignment (Ceramic and Steel Technology)		
Responsible:	Aneziris, Christos G. / Prof. Dr.-Ing. Volkova, Olena / Prof. Dr.-Ing.		
Lecturer(s):			
Institute(s):	Institute of Ceramics, Glass and Construction Materials Institute of Iron and Steel Technology		
Duration:	1 Semester(s)		
Competencies:	Analysis of tasks in the field of ceramics and steel technology Derivation of reasonable solutions Planning, implementation, and evaluation of experiments Presentation and written summarization of the problems (task, approach, analysis, results) from an engineering viewpoin		
Contents:	Specification of tasks by means of literature and patent researches, construction/modification of experimental facilities, conducting experimental investiation, interpretation of results and their presentation in the form of a written work, presentation and discussion of the work in a seminar, learning presentation skills		
Literature:	Project-specific		
Types of Teaching:	S1 (WS): Consultations, experimental activities / practical training / Seminar (12 SWS)		
Pre-requisites:	**Recommendations:** Knowledge of ceramic engineering and Technology of Iron and Steel		
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: Script MP: Colloquium [60min]		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: AP: Schriftliche Studienarbeit MP: Kolloquium [60min]		
Credit Points:	10		
Grade:	The Grade is generated from the examination result(s) with the following weights (w): AP: Script [w: 2] MP: Colloquium [60min] [w: 1]		
Workload:	The workload is 300h. It is the result of 180h attendance and 120h self-studies.		

Data:	FPD. MA. Nr. 3562 / Examination number: 50320	Version: 22.02.2017	Start Year: SoSe 2018
Module Name:	**Fundamentals of Plastic Deformation**		
(English):			
Responsible:	Prahl, Ulrich / Prof. Dr.-Ing.		
Lecturer(s):	Prahl, Ulrich / Prof. Dr.-Ing.		
Institute(s):	Institute of Metal Forming		
Duration:	1 Semester(s)		
Competencies:	Consolidated knowledge on the basics of plastic deformation (deformation mechanisms, flow stress, influences on flow stress, classification of forming processes, flow conditions). Students will be capacitated to understand and define strain and tension conditions in forming processes, geometric and kinematic conditions as well as calculating required force and work.		
Contents:	• Introduction into the subject field • Mechanisms of plastic deformation • Definition of forming specific characteristics • Flow stress behavior during hot and cold forming (including influences on flow stress) • Softening and hardening behavior • Methods to determine of flow stress • Constitutive equations in forming • Analytic determination of force and work • Introduction of several forming processes		
Literature:	Gottstein, Günter: Physical Foundation of Materials Science. Springer, 2004 Kachanov, L.M.: Fundamentals of the Theory of Plasticity, Dover Publications Dixit, P.M.: Plasticity Fundamentals and Application, CRC Press, Taylor&Francis Group		
Types of Teaching:	S1 (SS): 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:	LabWorkCer. MA. Nr. / Examination number: -	Version: 29.09.2017	Start Year: WiSe 2017
Module Name:	**Laboratory Ceramic Courses**		
(English):			
Responsible:	Aneziris, Christos G. / Prof. Dr.-Ing.		
Lecturer(s):	Schmidt, Gert / Dr.-Ing. Aneziris, Christos G. / Prof. Dr.-Ing. Hubálková, Jana / Dipl.-Ing.		
Institute(s):	Institute of Ceramics, Glass and Construction Materials		
Duration:	1 Semester(s)		
Competencies:	Students will understand and apply ceramic materials: • ceramic materials in micro structural design, • ceramic processing, • testing and (iv) application		
Contents:	6 experimental works with following topics: • Raw material assessment, • Slip casting, • Press forming, • Plastic forming, • Sintering and evaluation of the physical properties, • High-temperature properties		
Literature:	Introduction to the Principles of Ceramic Processing, James Reed Physical Ceramics, Yet-Ming Chiang, Dunbar Birnie III, W. David Kingery		
Types of Teaching:	S1 (WS): Laboratory work / Practical Application (5 SWS)		
Pre-requisites:	**Recommendations:** Ceramic Engineering, 2016-06-15 Basic fundamentals of materials science		
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: Preparation and execution of the experiments incl. lab report		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: AP: Vorbereitung und Durchführung der Experimente incl. Laborbericht		
Credit Points:	5		
Grade:	The Grade is generated from the examination result(s) with the following weights (w): AP: Preparation and execution of the experiments incl. lab report [w: 1]		
Workload:	The workload is 150h. It is the result of 75h attendance and 75h self-studies. The self-studies encompass: preliminary preparation, post-processing of experimental data, drafting of the 6 reports.		

Data:	MA. Nr. / Examination number: -	Version: 16.01.2018	Start Year: SoSe 2019
Module Name:	**Master Thesis (Technology and Application of Inorganic Engineering Materials)**		
(English):			
Responsible:	Aneziris, Christos G. / Prof. Dr.-Ing. Volkova, Olena / Prof. Dr.-Ing.		
Lecturer(s):			
Institute(s):	Institute of Ceramics, Glass and Construction Materials Institute of Iron and Steel Technology		
Duration:	1 Semester(s)		
Competencies:	The objective of the master thesis is to give the students the opportunity to apply the knowledge acquired during the studies on a research project.		
Contents:			
Literature:	Project specific		
Types of Teaching:	S1 (SS): Thesis / Thesis (6 Mon)		
Pre-requisites:	**Mandatory:** Abschluss aller Module. All modules have to be passed.		
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*: Script MP*: Colloquium [60 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*: Masterarbeit MP*: Kolloquium [60 min] * 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*: Script [w: 2] MP*: 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. It is the result of 0h attendance and 900h self-studies.		

Data:	MATSCI. MA. Nr. 2919 / Examination number: 51012	Version: 08.05.2017	Start Year: SoSe 2011
Module Name:	**Materials Science**		
(English):			
Responsible:	Leineweber, Andreas / Prof. Dr. rer. nat. habil.		
Lecturer(s):	Wetzel, Marius		
Institute(s):	Institute of Materials Science		
Duration:	1 Semester(s)		
Competencies:	Qualification for cooperation with engineers. The student is able to relate problems from engineering practice to fundamental concepts from Materials Science.		
Contents:	The lectures deal with the basics of materials science (structure, classes of materials), the main properties and the application of materials.		
Literature:	Askeland, D.R., The Science and Engineering of Materials, Chapman and Hall, London etc.Schatt, W.; Worch, H., Werkstoffwissenschaft, Deutscher Verlag für Grundstoffindustrie.W. D. Callister, jr. Materials Science and Engineering – An Introduction, New York etc.: John Wiley & Sons. Inc.		
Types of Teaching:	S1 (SS): Lectures (1 SWS) S1 (SS): 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: 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:	WERKMEC. BA. Nr. 253 / Examination number: 41906	Version: 11.07.2016	Start Year: WiSe 2016
Module Name:	**Mechanics of Materials**		
(English):			
Responsible:	Sandfeld, Stefan / Prof. Dr.		
Lecturer(s):	Sandfeld, Stefan / Prof. Dr.		
Institute(s):	Institute of Mechanics and Fluid Dynamics		
Duration:	1 Semester(s)		
Competencies:	Development of an understanding of the deformation behavior and failure mechanisms of technological materials; students will get familiar with elastic, plastic, viscous, viscoelastic and viscoplastic behaviors of materials; development of the ability to assess the behavior of materials and to design structures accordingly.		
Contents:	Most important ingredients are: • continuum mechanics foundations of stress, strain and displpacements • rheological models for elastic, plastic, viscous, viscoelastic, and viscoplastic deformation behavior • multi-axial continuum laws for anisotropic elasticity and plasticity • extended strength and failure theories / criteria for multiaxial loading		
Literature:	J. Lemaitre and J.-L. Chaboche: Mechanics of Solid Materials, Cambridge University Press,2000		
Types of Teaching:	S1 (WS): Lectures (2 SWS) S1 (WS): Exercises (2 SWS)		
Pre-requisites:	**Recommendations:** Basic knowledge in engineering 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: KA [120 min]		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: KA [120 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:	MTF. MA. Nr. 3563 / Examination number: 50225	Version: 31.01.2017	Start Year: SoSe 2018
Module Name:	**Melting Technology in Foundries**		
(English):			
Responsible:	Wolf, Gotthard / Prof. Dr.-Ing.		
Lecturer(s):	Dommaschk, Claudia / Dr.-Ing. Keßler, Andreas / Dr.-Ing.		
Institute(s):	Foundry Institute		
Duration:	1 Semester(s)		
Competencies:	- Acquirement of knowledge of ferrous and nonferrous alloys in views of heat treatment and metallurgy of melt - Students are able to apply the knowledge in the working life.		
Contents:	Metallurgy of cast iron, cast steel and nonferrous alloys; Design and function of melting furnaces; Melt treatment of ductile iron; melt treatment and degasing of aluminium alloys; Quality inspection of melts; Metallurgical caused casting defects		
Literature:	J. Campbell: Castings. Butterworth-Heinemann, 1991		
Types of Teaching:	S1 (SS): 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 [60 min]		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: KA [60 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:	MetMat. MA. Nr. 3213 / Examination number: 50114	Version: 27.06.2016	Start Year: WiSe 2016
Module Name:	**Metallic Materials**		
(English):			
Responsible:	Biermann, Horst / Prof. Dr.-Ing. habil		
Lecturer(s):	Weidner, Anja / Dr.-Ing.		
Institute(s):	Institute of Materials Engineering		
Duration:	1 Semester(s)		
Competencies:	Students will get familiar with metallic materials (ferrous materials, non-ferrous metals, light metals, high-temperature metals), their microstructure and mechanical properties as well as heat treatment. Focus is given to plastic deformation and failure. The module will enable the students to differentiate the different groups of metallic construction materials.		
Contents:	Most important topics are: Ferrous metals (plain carbon steels, high-alloyed steels, cast irons); Non-ferrous metals (e.g. copper, nickel) Light metals (aluminum, titanium, magnesium) High-temperature alloys (superalloys, intermetallic alloys)		
Literature:	M. F. Ashby, D.R.H. Jones, Engineering materials 2, 2nd ed., Butterworth-Heinemann, Oxford, 1998 James F. Shackelford, Introduction to Materials Science for Engineers, 7th ed. Addison Wesley., 2009		
Types of Teaching:	S1 (WS): Metallic Materials / Lectures (2 SWS)		
Pre-requisites:	**Recommendations:** Basic fundamentals of physics, chemistry and solid materials		
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:	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:	PCM MA. Nr. 3582 (for students of TAIM only) / Examination number: -	Version: 16.01.2018	Start Year: SoSe 2018
Module Name:	**Practical Course Metallurgy**		
(English):			
Responsible:	Volkova, Olena / Prof. Dr.-Ing.		
Lecturer(s):	Heller, Hans-Peter. / Dr.-Ing. Kreschel, Thilo / Dr.-Ing. Mola, Javad / Dr. Gutte, Heiner / Dr.		
Institute(s):	Institute of Iron and Steel Technology		
Duration:	1 Semester(s)		
Competencies:	Upon successful completion of the module, the students will have ready-to-use practical knowledge of iron and steel processing, testing and application, heating, melting, solidification, thermophysical properties of melted steels and slag. This knowledge enables the students to independently evaluate and solve application-oriented engineering problems.		
Contents:	Thermoelectrically temperature measurements, optical temperature measurements, reduction of iron ores, heating and melting by induction, electro slag remelting, solidification of metals, ladle stirring by inert gas, metallurgical analysis I, metallurgical analysis II, metallurgical analysis III, EMF-measurement in liquid steel, thermophysical properties of slag and metals.		
Literature:	• F. Oeters, Metallurgy of steelmaking, Verlag Stahleisen GmbH, Berlin 1994 • A. Babich, D. Senk, H.W. Gudenau, Ironmaking, Verlag Stahleisen GmbH, Duesseldorf, 2016 • S. Seetharaman, TREATISE ON PROCESS METALLURGY, Volume 3: Industrial Processes, Part A, Elsevier, 2014		
Types of Teaching:	S1 (SS): Practical Application (5 SWS)		
Pre-requisites:	**Recommendations:** Knowledge in chemistry, natural science or other relevant areas.		
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: Preparation and execution of the experiments incl. lab report		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: AP: Vorbereitung und Durchführung der Experimente incl. Laborbericht		
Credit Points:	5		
Grade:	The Grade is generated from the examination result(s) with the following weights (w): AP: Preparation and execution of the experiments incl. lab report [w: 1]		
Workload:	The workload is 150h. It is the result of 75h attendance and 75h 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:	RefCerMA.Nr. 3580 (for Students of TAIM only) / Examination number: -	Version: 14.06.2017	Start Year: WiSe 2018
Module Name:	**Refractory Ceramics**		
(English):			
Responsible:	Aneziris, Christos G. / Prof. Dr.-Ing.		
Lecturer(s):	Aneziris, Christos G. / Prof. Dr.-Ing.		
Institute(s):	Institute of Ceramics, Glass and Construction Materials		
Duration:	1 Semester(s)		
Competencies:	Students will understand an apply • Refractory ceramics in micro and macro structural design, • refractories processing, • testing and (iv) application.		
Contents:	Most important ingredients are: • definition, bonding, • micro structure design, density, porosity • mechanical properties, • thermal and thermo mechanical properties • chemical properties • basics in refractory technology, coarse- and fine-grained refractories • dense shaped products, silica bricks and fused silica ceramics, fireclay and high alumina bricks, basic bricks, zircon- and zirconia containing bricks, carbon and graphite bricks, carbon and graphite containing refractories, silicon carbide bricks, fine-grained oxide and non oxide ceramics, fusion cast bricks, ceramics with low thermal expansion • unshaped refractory materials • heat-insulating ceramic materialsapplication in iron and steelapplication in non ferrous • application in cement and chemistry application in foundries		
Literature:	Refractory Ceramics, Routschka, Granitzki, Willey Introduction to the Principles of Ceramic Processing, James Reed Physical Ceramics, Yet-Ming Chiang, Dunbar Birnie III, W. David Kingery, Refractory Castables Engineering, Luz, Braulio, Pandolfelli, Göller		
Types of Teaching:	S1 (WS): Lectures incl. exercise and practise. / Lectures (2 SWS)		
Pre-requisites:	**Recommendations:** Basic fundamentals of materials science		
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 6 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 6 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 30h attendance and 90h self-studies.		

Data:	Examination number: -	Version: 16.01.2018	Start Year: SoSe 2019
Module Name:	**Research Seminar and Journal Club (Technology and Application of Inorganic Engineering)**		
(English):			
Responsible:	Aneziris, Christos G. / Prof. Dr.-Ing. Volkova, Olena / Prof. Dr.-Ing.		
Lecturer(s):			
Institute(s):	Institute of Ceramics, Glass and Construction Materials Institute of Iron and Steel Technology		
Duration:	1 Semester(s)		
Competencies:	Upon successful completion of the module, the students will have in-depth knowledge in: • Use of databases for literature and patent surveys, • Selection of key literature and their brief presentation, • Evaluation and interpretation of specialized literature and patents, • Systematic presentation of content in the form of short lecture and a written work. This knowledge enables the students to independently solve engineering problems of relevance.		
Contents:	Most important ingredients are: • Literature review on the seminar topic • Attending the seminar • Interacting with the speakers		
Literature:	seminar specific		
Types of Teaching:	S1 (SS): Seminar (3 SWS)		
Pre-requisites:	**Recommendations:** Knowledge of Ceramic Engineering and Technology of Iron and Steel		
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: Literature report		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: AP: Literaturbericht		
Credit Points:	3		
Grade:	The Grade is generated from the examination result(s) with the following weights (w): AP: Literature report [w: 1]		
Workload:	The workload is 90h. It is the result of 45h attendance and 45h self-studies.		

Data:	SA. MA. Nr. / Examination number: 50734	Version: 20.02.2015	Start Year: WiSe 2016
Module Name:	**Sensors and Actuators**		
(English):			
Responsible:	Joseph, Yvonne / Prof. Dr. rer. nat.		
Lecturer(s):	Joseph, Yvonne / Prof. Dr. rer. nat.		
Institute(s):	Institute of Electronic and Sensor Materials		
Duration:	1 Semester(s)		
Competencies:	Apply techniques for qualitative and quantitative exploration and physicochemical characterization of resources present in the environment, including spatial and temporal variability. Apply techniques to assess environmental impacts of products and processes. Insights in the different (technological) options for optimizing resource flows in the different parts of the value chain and be able to compare them, taking technical and economic aspects as well as social and environmental impact into account. Consult specialist literature and interpret it critically according to scientific standards. Understand the complexity of a problem/system using quantitative methods. Consider specifications and technical, economic and social preconditions and transform them into a sustainable and qualitative system, product, service or process. Entrepreneurial mindset to develop new ideas within a multidisciplinary context.		
Contents:	Physical (e.g. temperature, force, acceleration, etc.) chemical (gas sensors, ion sensors) and biological sensors and actuators will be discussed. First, the physical principles are presented and then applications will be given. The focus is on the relationship between the parameters of the finished device and the properties of the used materials to enable their applications. Specific examples of sensors and actuators are discussed in their measurement environment.		
Literature:	Peter Gründler, Chemical Sensors, Springer, 2007, ISBN: 9783540457435;		
Types of Teaching:	S1 (WS): Lectures (2 SWS) S1 (WS): Seminar (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 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 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.		

Data:	SSNFMP MA. / Examination number: -	Version: 25.01.2018	Start Year: SoSe 2019
Module Name:	**Simulation of Sustainable Nonferrous Metallurgical Process**		
(English):			
Responsible:	Stelter, Michael / Prof. Dr.-Ing. Renker, Dirk / Dr.-Ing. Reuter, Markus / Prof. Dr.		
Lecturer(s):	Reuter, Markus / Prof. Dr.		
Institute(s):	Institute for Nonferrous Metallurgy and Purest Materials Foundry Institute		
Duration:	2 Semester(s)		
Competencies:	In the course the participants will learn: • modelling and simulation of hydro- and pyrometallurgical reactors for primary and secondary resources and determination of mass and energy balances • determination of ecological and economic footprint of reactors • 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 • determination of mass and energy balances of the complete flowsheet and determine optimal processing routes • determination of ecological and economic footprint of complete flowsheets • 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 nonferrous process metallurgy (e.g. TSL, Kaldo, flash smelting, QSL 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 types as a function of feed types. The student will understand 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.		
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): Lectures (2 SWS) S2 (WS): Lectures (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
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: AP: Simulationsbeleg
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 60h attendance and 120h self-studies.

Data:	ST MA. Nr. / Examination number: -	Version: 16.01.2018	Start Year: SoSe 2019
Module Name:	**Steel Application**		
(English):			
Responsible:	Volkova, Olena / Prof. Dr.-Ing.		
Lecturer(s):	Mola, Javad / Dr.		
Institute(s):	Institute of Iron and Steel Technology		
Duration:	1 Semester(s)		
Competencies:	The students acquire the knowledge of the application-related properties, in particular mechanical properties, of steels. Upon successful completion of the module, the students are familiar with the criteria and considerations in the design of the chemical composition and thermomechanical processing for various structural and engineering applications. The student can apply their knowledge to select steels with a broad range of properties from soft formable steels to advanced high-strength steels for more demanding applications.		
Contents:	Classification of steels based on the application area, thermomechanical processing of the following classes of steels to adjust the required properties: formable sheet steels, engineering quenched and tempered steels, structural steels, pearlitic steels, surface-treated steels, tool steels, electrical steels, and high Mn steels		
Literature:	- B.C. De Cooman, J. Speer, Fundamentals of Steel Product Physical Metallurgy, Assn. of Iron and Steel Engineers, 1st Ed., 2011. - Werkstoffkunde Stahl, Volume 2: Application, Springer Verlag, 1985.		
Types of Teaching:	S1 (SS): Lectures (2 SWS) S1 (SS): Seminar (1 SWS)		
Pre-requisites:	**Recommendations:** Knowledge of the fundamentals of Materials Science and Engineering		
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:	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:	TIS. MA. Nr. 3564 / Examination number: 50926	Version: 26.04.2017	Start Year: WiSe 2018
Module Name:	**Technology of Iron and Steel**		
(English):			
Responsible:	Volkova, Olena / Prof. Dr.-Ing.		
Lecturer(s):	Gutte, Heiner / Dr.		
Institute(s):	Institute of Iron and Steel Technology		
Duration:	1 Semester(s)		
Competencies:	Upon successful completion of the module, the students will have ready-to-use knowledge of the crude iron production, alternative technologies of iron- and steelmaking, and the chemical reactions involved. This knowledge enables the students to independently evaluate and solve application-oriented engineering problems.		
Contents:	Ironmaking, Ore Preparation, Coke, Blast Furnace Process, Blast Furnace Reactions, Injectants, Behavior of Minor Elements and Impurities, Formation of Hot Metal and Slag, Energy and Materials Balance of Blast Furnace, DRI Processes, Smelting Reduction Processes, New Developments of Ironmaking Technologies, Hot Metal Pretreatment, Converter Steelmaking, Process Phenomena in Converter Steelmaking, Slag Formation, Postcombustion, Reactions in Converter Process, Energy and Materials Balance of Converter Process, Electric Furnace Steelmaking, AC and DC Furnaces, Electrodes, Foaming Slag, Energy and Materials Balance of EAF Process, Special Furnace Constructions, Hybrid Process for Steelmaking of Scrap and Hot Metal, Secondary Steelmaking, Continuous Casting of Steel		
Literature:	• F. Oeters, Metallurgy of steelmaking, Verlag Stahleisen GmbH, Berlin 1994 • A. Babich, D. Senk, H.W. Gudenau, Ironmaking, Verlag Stahleisen GmbH, Duesseldorf, 2016 • S. Seetharaman, TREATISE ON PROCESS METALLURGY, Volume 3: Industrial Processes, Part A, Elsevier, 2014		
Types of Teaching:	S1 (WS): Lectures (2 SWS) S1 (WS): Seminar (1 SWS)		
Pre-requisites:	**Recommendations:** Knowledge in chemistry, natural science or other relevant areas.		
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 [45 min]		
	Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: MP [45 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: -	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:	TFD. MA. Nr. / Examination number: -	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: -	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 15. Mai 2018

gez.
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Rektor

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