name of the module	Corrosion Protection			
semester	6			
credits (28 hours)	5			
workload / hours	summary 140	time of contact 60	privat study 60	preparation for exams 20
level	Not yet defined			
preconditions	Anorganic and organic chemistry, physical chemistry, binders and pigments, basics of coatings formulation			
intention of all, coordination in study	Understanding the mechanisms of corrosion as base for the deduction of effective methods for corrosion protection Knowledge of common methods for corrosion protection			
content	**Part 1: Corrosion** Homogeneous corrosion of metals in aquous electrolytes thermodynamics and kinetics of electrochemical reactions, intrumentation, corrosion in various aquous media Heterogeneous corrosion of metals in aquous electrolytes galvanic corrosion, selective corrosion, concentration cells, passivity, local deterioration of passive layers, intergranular corrosion, pitting corrosion, corrosion cracking Atmospheric corrosion Corrosion of specific materials **Part 2: Corrosion protection** Design of corrosion resistant components Corrosion inhibitors Electrochemical corrosion protection Surface preparation for passive corrosion protection Chemical conversion layers Organic coatings for corrosion protection Duplex systems			
literatur	D.A.Jones, Principles and Prevention of Corrosion, Macmillan Publishing Company, 1992 Vorlesungen über Korrosion und Korrosionschutz von Werkstoffen, (2 Bände), Institut für Korrosionsschutz Dresden, TAW-Verlag, Wuppertal, 1997 Skript zur Vorlesung			
offered	☒ every semester	☐ in winter term	☐ in summer-term	
useful for other courses of studies				
responsibel	Prof. Dr. Lobnig			

Sections and efficiency statemants

form of teaching, form of learing	contingent/ hours	learing targets, targets of qualification	efficiency control	estimated time of students work
lecture with post processing	3	Evaluation of the corrosion properties of metals Ability to choose and evaluate methods for corrosion protection	Written exam 60 min	120
exercises	1	Application of the methods to simple examples of use		20
summary	4			140

Course name	Laboratory “Corrosion and Corrosion Protection”			
In semester number	CIB 6, CIB 7			
ECTS- Credits (30 hours)	6			
Workload / hours	Total 180	Contact time 90	Self-study 60	Preparation for examination 30
Prerequisites	Basic knowledge of corrosion and coatings technology			
Total target	- Knowledge of methods to evaluate the corrosion behaviour of metals - Knowledge of methods to evaluate the effectiveness of corrosion protective measures - Ability to apply these methods to practical problems			

Content	***Experiments***
	- Electrode potentials
	- I-E-curves of Fe, Fe-Cr and Fe-Cr-Ni alloys with varying Cr-concentrations in sulfuric acid, passivity
	- Atmospheric corrosion of Fe with NaCl-droplet deposition
	- Pitting corrosion of Fe-Cr-Ni alloys – effect of potential sweep rate, steel composition, and chloride concentration
	- Measurement of corrosion rates with different methods Tafel method
	  - Polarisation resistance method
	  - Volumetric method
	  - Gravimetric method
	- Effectivity and inhibiting mechanism of corrosion inhibitors
	- Anodic and cathodic blistering of organic coatings on steel
	- Phosphating and effect of errors in the phosphating process
	- Osmotic blistering of organic coatings
	- Cathodic delamination
	- Filiform corrosion
	- Phospatizing
	- Determination of resistances and capacitances of electronic circuits using impedance spectroscopy
	- Water uptake of organic coatings
	- Comparison of corrosion resistance of coatings, e.g. joghurt lids of aluminum cans
	- Non-destructive evaluation of steel bars in concrete
	- Analysis of corrosion failures			

Reference material	Current publications and patents D.A.Jones, Principles and Prevention of Corrosion, Macmillan Publishing Company, 1992 Egon Kunze, Korrosion und Korrosionsschutz, Band 1 bis 6, Wiley-VCH, 2001			
Module owner	R. Lobnig			
Language	English			

Description

Type of instruction/ type of learning	Hours/week	Targets, learning outcomes	Type of assessment	Estimated student workload in hours
Laboratory “Corrosion and Corrosion Protection”	6	***Knowledge of electrochemical and classical testing methods*** - Measurement of electrode potentials - Potentiostatic and galvanostatic	Short presentation of experimental results, Lab work, Lab journal, Written examination	200

		measurements - Electrochemical noise - Impedance spectroscopy - Scanning Kelvin probe - Salt spray testing - Tests with temperature-relative humidity-cycling - Metallography - Electron microscopy ***Ability to apply these techniques to practical problems***		