



## COURSE DATASHEET

<b>Semester:</b>	2013/14/2
<b>Course:</b>	Corrosion laboratory experiments
<b>Code:</b>	VEMKFKT15XV
<b>Responsible department:</b>	Department of Physical Chemistry
<b>Department code:</b>	MKFK
<b>Responsible instructor:</b>	dr. Tamás Kristóf

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### Course objectives:

Knowledge of basics of corrosion laboratory experiments

### Course content:

Design of corrosion experiments, data acquisition. Corrosion media, corroded materials, experimental conditions.

Sample preparation for corrosion testing. Specific treatment for iron, steel and aluminium.

Specification for different experimental methods.

Standard corrosion testing methods. ASTM methods. Immersion tests. Tests in spray, gas or in climatic chambers.

Optical qualification methods.

Electrochemical methods I. OCP and noise measurements.

Electrochemical methods II. Potentiostatic and galvanostatic experiments.

Special methods for surface analysis I. Determination of macroscopic behaviours.

Special methods for surface analysis II. Ellipsometry and different spectroscopic methods.

Field and service testing methods. Interrupted methods. Monitoring.

Testing methods for coatings.

Evaluating high pressure and high temperature testing.

Testing of corrosion inhibitor efficiency.

Application of PC in corrosion testing.

Introduction. Formation of images. Sample preparation. Ideal optical systems

Newton's equation. Construction of image of complex optical system.

Real optical system. Mirrors, lenses. Errors of image formation. Magnification of microscope.

Measurements with microscope.

Electrochemical equilibria, cell, potential. Analog, digital voltmeters, converters.

Measurements of coating resistance, structure to electrolyte potential, electrode potential, current, stray current.

Measurement of polarisation curve. Transient techniques in electrochemistry. Control. Ideal operational amplifiers. Inverting and noninverting amplifier circuit.

Control circuits. Basic circuits of potentiostat. IR compensation. Galvanostats.

Calculations with complex numbers. Methods of electrochemical impedance measurement.

FRA. Measurement system for EIS. Model of the electrochemical system.



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### Course content:

Simplification of the model. Impedance of a redox system.  
Testing of raw materials for paints. Physical and chemical methods. Testing of paints.  
Preparation of test panels, conditioning. Preparation of free-film. Determination of coatings properties.  
Colour measurement. CIE colour field. Transformation of colour field. Measurement of whiteness.  
Atmospheric and accelerated corrosion tests.  
Data acquisition, DAQ-cards, GPIB, RS-232. Data acquisition and analysis softwares.

### Requirements, evaluation and grading:

After a half an hour's preparation the examinee gives an oral presentation on the topic for about 20-25 minutes.  
Fail (1) when the examinee is unable to prove either the definition of the basic notions or the short scheme of things connected with the topic.  
Pass (2) when the examinee is able to interpret the basic notions of the topic.  
Satisfactory (3) when the examinee is well-versed in the basic notions of the topic and is able to present their logic connections - with the help of the examiner.  
Good (4) when the examinee provides a logic, well-structured presentation with all the important facts and connections but he does not know or partly knows the required reading material connected with the topic.  
Very good (5) when the examinee gives a logic, excellent, well-structured, perfect in details oral presentation that completely reveals the connection of the concepts within the topic.

### Required and recommended readings:

Handbook on corrosion testing and evaluation, ed. W.H. Ailor, John Wiley and Sons, Inc. N.Y. 1971.  
Vonatkozó magyar szabványok.  
Erdey-Grúz T., Prosz J.: Fizikai kémia praktikum, Tankönyvkiadó Bp. 1968.  
Lakk és Festék Zsebkönyv, Szerk. Kovács L., Műszaki Könyvkiadó Bp. 1982.  
Corrosion basics ed. A. de S. Brasunas, NACE, Houston, 1984.  
W.H. Ailor: Handbook on corrosion testing and evaluation, Wiley, New York, 1971  
Corrosion Monitoring Handbook Hobles, London, 1984.  
D.P. MacDonald: Transient Techniques in Electrochemistry, Plenum Press. New York, 1977.  
Active Library on Corrosion, ed: W.F. Bogaerts, K.S. Agema, NACE, Houston, 1992