Course title:	**Application of Scanning Electron Microscopy in Materials Science**
Institute/Division:	Institute of Materials Engineering, Faculty of Materials Engineering and Physics
Course code:	
Erasmus subject code:	
Number of contact hours:	30 hours
Course duration:	1 semester
ECTS credits:	5

Course description:

The course “Application of Scanning Electron Microscopy in Materials Science” are conducted theoretical and practical classes.

Theoretical part:

Historical overview. Base of electron microscopy. Types of microscopes. Basics of the construction and operation of a scanning electron microscope. Creating an image in the scanning microscope. Resolving power and depth of field in the scanning electron microscope. Observation techniques: contrast secondary electron, contrast backscattered electrons. Microanalysis of chemical composition using Energy-Dispersive X-ray Spectroscopy (EDS) and wave length (WDS) of the characteristic X-rays. Preparation of samples for observation. Examples of practical use of scanning electron microscopy.

Practical part:

Preparation of test samples. Practical classes using a scanning electron microscope. Preparation of non-conductive materials, the use of the spraying process gold. Observations of conductive and non-conductive materials. Observations topography fractures of metal materials. Research factual. Analysis brittle, plastic and plastic-brittle. Observation of topography fractures of polymeric materials. Observation of the microstructure of the samples digested and received ones. The use of phase contrast observation of the microstructure. Practical use of Energy-Dispersive X-ray Spectroscopy EDS to evaluate the quantitative and qualitative chemical composition in micro areas. Observations and measurements of the thickness of the layers. Analysis of changes in the chemical composition of the diffusion layers.

Literature:

1. Scanning Electron Microscopy - Physics of Image Formation and Microanalysis Author: Ludwig Reimer, ISBN: 978-3-642-08372-3,
2. Scanning Electron Microscopy and X-ray Microanalysis**.** Third Edition Authors: Goldstein, J., Newbury, D.E., Joy, D.C., Lyman, C.E., Echlin, P., Lifshin, E., Sawyer, L., Michael, J.R.
3. Scanning Electron Microscopy, Edited by Viacheslav Kazmiruk, ISBN 978-953-51-0092-8

Course type:	lectures (15 hours), laboratory sessions (15 hours)
Assessment method:	tests during the semester, reports on laboratory classes

Prerequisites:	basics of materials science
Primary target group:	Materials Science, Materials Engineering
Lecturer:	Krzysztof Miernik, PhD, Rafał Bogucki PhD
Contact person:	Rafał Bogucki, e-mail: rbogucki@mech.pk.edu.pl
Remarks:	