

Course title: **Structural aspects of fracture**
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 "Structural aspects of fracture" are conducted theoretical and practical classes.

Theoretical part:

Historical view. Introduction to the problems of fracture mechanics. The role of fractures in the cracking process. Discussion of factors affecting the nucleation and the course of decohesion processes. The role of band thickness and state of stress in the cracking process. The phenomenon of concentration of stress. Influence of microstructural factors and temperature on the cracking process. Characteristics of brittle and ductile fracture mechanisms.

Practical part:

The program will include assessment of changes in mechanical properties and observation of decoherence phenomena using scanning electron microscopy. Analysis of the effect of stress concentration on the ductility and strength of structural steel. Influence of temperature and methods of determining brittle transition temperature. The influence of heat treatment on microstructure, mechanical properties and the course of destruction processes. Analysis of the effect of the stress concentration phenomenon on the ductility of structural steels.

Literature:

1. Scanning Electron Microscopy - Physics of Image Formation and Microanalysis, Author: Ludwig Reimer, ISBN: 978-3-642-08372-3,
2. Fracture Mechanics Fundamentals and Applications, Author: Ted L. Anderson, CRC Press, 2005
3. Fracture and Fatigue Control in Structures, Third Edition: Applications of Fracture Mechanics, Autors: John Barsom, Stanley, ISBN-13: 978-0750673150, 1999.

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: Rafał Bogucki PhD, Krzysztof Miernik, PhD.
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Remarks: