Advanced Engineering Materials

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Faculty	Faculty of Materials Science and Technology
Type of study	Follow-up Master
Language of instruction	English
Code of the programme	N0715A270005
Regular period of the study	2 years
Cost	50,000 CZK per semester
Coordinating department	Department of Materials Engineering and Recycling
Coordinator	doc. Ing. Petra Váňová, Ph.D.
Keywords	relations between materials structure and properties, advanced engineering materials, materials structure, materials properties, degradation mechanisms of materials

About study programme

The study program Advanced Engineering Materials, taught in English, is a follow-up to the bachelor study program Materials Engineering. The study program is intended primarily for foreign students – self-payers. The study program focuses on a wide range of advanced engineering materials, their structure and properties, in particular the relationship between material properties and their structure, the possibilities of further material processing and various methods of material properties testing. Workplaces that provide tuition in the study program have laboratories that stand out in comparison with first-class workplaces in developed countries. Students can participate in the solution of industrial problems already during their study. The study program offers an exceptionally good perspective from the point of view of the labour market.

Graduate's employment

Graduates will find a wide range of jobs in engineering, metallurgical, automotive industry, in companies oriented to the production and/or processing of polymer materials, ceramics, etc. as highly qualified experts for solving a wide range of materials problems, e.g. as technologists, managers, etc. Graduates can also find employment in institutions dealing with research and development in the field of materials.

Study aims

The primary objective of the study is to endue students with such knowledge and skills as to be able to analyze materials, their production technologies, utility properties, etc.; furthermore to carry out an advanced design of engineering materials for the given conditions of use; to design appropriate kinds of tests to evaluate the properties of materials and methods for evaluating structural characteristics, to interpret the tests competently and to be able to carry out certain kinds of tests themselves; to perform expertise in the field of materials engineering, etc.

Graduate's knowledge

The graduates of the study program:
• Demonstrate knowledge of basic theoretical courses – e.g solid state physics, phase transformations, physical metallurgy, fracture mechanics at a level making possible their application in other courses and in engineering practice.
• Master detailed characteristics of advanced engineering materials including materials for special purposes; they understand in particular detailed relations between their internal structure and properties in use; they also understand advanced concepts of increasing materials properties through changes in production technologies and material structure changes.
• Are able to characterize both basic and advanced methods of materials properties testing, as well as sophisticated methods of

structure phase analysis of materials. They are capable to choose appropriate testing methods to evaluate the properties and structure for different types of materials and different conditions of use.
• They master advanced concepts of materials degradation processes and characteristics that determine resistance of materials to these degradation processes.
• They are aware of the limits of defined concepts, approaches, conditions of their use, or their limitations in practice.

Graduate's skills

Graduates are able independently and creatively:
• To perform a comprehensive analysis of materials, their production technologies, utility properties, etc.; to analyze and evaluate existing technical solutions in the field of materials and also propose new solutions.
• To perform advanced design (selection) of engineering materials for given conditions of use (mechanical loading, external environment, etc.).
• To propose appropriate kinds of tests to evaluate properties of materials and methods for evaluation of structure characteristics, to interpret testing results competently and to carry out some kinds of tests by themselves.
• To perform demanding expertise in the field of materials engineering.
• To analyze the relevant information and on their basis to evaluate existing technological processes in the materials production and processing, or to propose new technological procedures.
• To use obtained knowledge for the theoretical and experimental research of materials, especially for research and development of new materials with increased utility properties and their introduction into production.

Graduate's general competence

The graduates dispose of general competencies in the extent that is defined by the National qualifications framework for tertiary education with emphasis to communication, governing and organization skills. They are able to communicate at least in one foreign language.

Professions

- Materials production technologist
- RαD engineer in the field of materials science
- Materials specialist

Hard skills

- Knowledge of methods of non-destructive testing of technical materials
- Knowledge of methods for evaluating mechanical properties of technical materials
- Knowledge of methods for evaluating the structural characteristics of technical materials

Study curriculum

- form Full-time (en)