

## Objective of the Master's Degree Program in Materials Engineering and Professional Competencies

### Program Objective:

The aim of the program is to train materials engineers who, based on their knowledge of the fundamental sciences related to the structure, properties, and behavior of technical materials (metals, ceramics, polymers, composites, and new functional materials), are capable of designing and operating manufacturing, forming, and processing technologies at a high level. They are also able to perform and coordinate organizational and management tasks related to the field in a systematic manner, and to carry out and lead research and development activities in materials engineering. Graduates are prepared to continue their studies in doctoral programs.

### Professional Competencies of the Materials Engineer

#### a) Knowledge

- Possesses detailed knowledge of scientific and technical theories and practical procedures related to the field of materials engineering.
- Has in-depth understanding of the key properties and application areas of structural materials relevant to their specialization.
- Is thoroughly familiar with the rules of technical documentation.
- Has a general understanding of organizational tools and methods related to management.
- Has a general understanding of the legal regulations necessary for professional practice.
- Possesses knowledge of measurement techniques and measurement theory relevant to the field.
- Has basic knowledge of information and communication technologies related to professional activities.
- Has comprehensive knowledge of modern material structures and material technologies.

#### b) Skills

- Able to formulate problems related to the field in mathematical terms and solve the resulting equations (or systems of equations) analytically or numerically.
- Possesses appropriate manual skills.
- Capable of processing and organizing information collected during the operation of material production systems and processes, and drawing conclusions through modeling.
- Solves tasks related to quality assurance, measurement techniques, and process control in material production systems and technologies.
- Designs complex systems based on a systems-oriented and process-oriented way of thinking.
- Based on the relationships between different technical materials, can determine their composition, structure, and properties, and selects and operates the necessary instruments.

- Able to conduct laboratory tests, process and evaluate measurement results, and document findings.
- Operates machines and equipment relevant to their specialization.
- Applies characteristic manufacturing technologies relevant to their specialization.
- Strives to enrich the knowledge base of the field with original ideas through self-education.
- Plans and manages the use of necessary technical, economic, environmental, and human resources.
- Capable of forming well-founded engineering opinions on materials engineering issues and representing their views both in Hungarian and in foreign languages.

### c) Attitude

- Strives to apply the latest results of their field to support their own professional development.
- Aims to enrich the knowledge base of the field with original ideas through self-education.
- Committed to enforcing sustainability and energy efficiency requirements.
- Strives to independently or collaboratively plan and execute tasks at a high professional level.
- Aims to perform work with a complex approach based on systems-oriented and process-oriented thinking.
- Investigates the possibilities of setting research, development, and innovation goals and strives to achieve them.
- Open to professional further training that supports self-improvement and self-development.
- Dedicated to high-quality work and aims to promote this mindset among colleagues.

### d) Autonomy and Responsibility

- Acts independently and proactively in solving professional problems.
- Takes responsibility for sustainability and environmental awareness.
- Makes decisions independently and responsibly, consulting with representatives of other fields (especially legal, economic, energy, and environmental), and assumes responsibility for those decisions.
- In decision-making, considers and applies principles of environmental protection, quality assurance, consumer protection, product liability, equal access, workplace health and safety, technical, economic and legal regulations, and engineering ethics.