Template

SSC-based Objective-Module Matrix

TC 05

EDUCATIONAL PROGRAM

7M07153 – Materials science and engineering (Master's degree)

ASIIN Subject-Specific Criteria (SSC)	Learning Outcomes of the Study Programme	Corresponding Modules
Knowledge, comprehension and application Graduates have		
profound knowledge and in-depth comprehension of the subject-specific fundamentals of the main focus of their degree programme (theory and practice),	Demonstrate advanced knowledge of modern materials science, nanomaterials, material structures, properties and processing technologies; select appropriate methods for solving materials science problems (LO6, LO7).	Materials Science and Technologies of Modern and Promising Materials; Materials Science and Technologies of Advanced Materials; Modern Problems of Materials and Process Sciences
advanced knowledge of related subject areas,	Integrate interdisciplinary knowledge and apply engineering, scientific and technological approaches in professional activities (LO3).	History and Philosophy of Science; Philosophical and Methodological Problems of Science and Technology; Sustainable Development Strategies
developed a critical awareness of new insights in their discipline,	Analyse current trends and recent advances in materials science and nanotechnology for research and professional activities (LO6).	Modern Problems of Materials and Process Sciences; Materials Science and Technologies of Advanced Materials
mastered the current state of the art of their subject area.	Apply modern analytical methods and advanced scientific equipment for characterization and investigation of materials (LO4, LO9).	Modern Methods of Structural Analysis in Materials Science; Materials Research Methods; Probe Methods of Diagnostics of the Structure and Properties of Nanomaterials

Research, analysis, problem solving and evaluation Graduates		
are able to conduct independent scientific work,	Justify the choice of experimental methods, plan and conduct experiments, and investigate material properties independently (LO1, LO2, LO9).	Materials Research Methods; Modern Methods of Structural Analysis in Materials Science; Master's Thesis
possess the ability to independently identify and analyse complex problems,	Select optimal approaches and methods for solving scientific and technological problems in materials science (LO7).	Modern Problems of Materials and Process Sciences; Materials Science and Technologies of Advanced Materials
are able to determine independently and using suitable methods the state of the art related to a certain problem, to clearly define an objective and to create a solution matrix,	Evaluate current developments in materials science, formulate research objectives and develop solution strategies (LO6, LO7, LO8).	Intellectual Property and Research; Modern Problems of Materials and Process Sciences; Materials Research Methods
can independently develop a solution for a proposal or test a hypothesis, present and discuss results, come to conclusions and summarise them in an understandable way,	Plan experiments, test hypotheses, analyse data and communicate scientific results effectively (LO2, LO8, LO9).	Materials Research Methods; Professional Training in English; Master's Thesis
are able to expand their knowledge and skills independently and methodically,	Continuously update professional knowledge and independently acquire new competences in advanced materials science (LO6).	Materials Science and Technologies of Advanced Materials; Modern Problems of Materials and Process Sciences; Master's Thesis

are able to critically reflect, discuss and evaluate research concepts and results,	Critically analyse scientific concepts, research findings and technological developments (LO3, LO6).	History and Philosophy of Science; Philosophical and Methodological Problems of Science and Technology; Intellectual Property and Research
are in a position to use innovative methods to solve technological problems and to develop new methods where necessary,	Apply physical and chemical methods for obtaining nano-objects and composites and use innovative technologies in materials development (LO5).	Technologies of Zero-Dimensional Nanoobjects; Structure and Properties of Carbon Nanomaterials; Composite Materials with Desired Properties
are able to formulate and to solve problems in new or emerging areas within their field of specialization,	Apply modern scientific approaches to solve problems in nanotechnology and advanced materials engineering (LO5, LO6, LO7).	Technologies of Zero-Dimensional Nanoobjects; Materials Science and Technologies of Advanced Materials; Modern Problems of Materials and Process Sciences
are able to solve scientific and technical problems in accordance with their level of knowledge and understanding and in collaboration with representatives of other disciplines,	Integrate multidisciplinary knowledge and collaborate effectively in solving engineering and research problems (LO3).	Sustainable Development Strategies; High Technologies: From Research to Business; Psychology of Communication
can use their creativity to develop new and original ideas,	Develop innovative materials and technological solutions using advanced engineering approaches (LO5, LO8).	Composite Materials with Desired Properties; Materials for 3D Technology; Multiphase Structures and Methods for Calculating Phase Diagrams

are able to further develop their skills and competences during their professional career and to make use of them accordingly.	Demonstrate readiness for lifelong learning and continuous professional development (LO6).	Master's Thesis; Professional Training in English
Application Graduates		
are able to combine theory and practice in order to solve scientific and/or technological problems,	Integrate theoretical knowledge and experimental methods to solve practical materials science problems (LO2, LO5, LO8, LO9).	Materials Research Methods; Technological Quality Assurance of Materials; Probe Methods of Diagnostics of the Structure and Properties of Nanomaterials
are able to combine knowledge and learning from various areas and to cope with complex issues,	Apply interdisciplinary approaches to solve complex engineering and scientific challenges (LO3).	Sustainable Development Strategies; History and Philosophy of Science; High Technologies: From Research to Business
have comprehensive knowledge of applicable technologies and methods and their limitations,	Select and apply modern analytical, technological and experimental methods with awareness of their limitations (LO4, LO5, LO7).	Modern Methods of Structural Analysis in Materials Science; Materials Research Methods; Technologies of Zero-Dimensional Nanoobjects
know the non-technological implications of the work of engineers and scientists, particularly the safety, social and ethical consequences as well as the general social context of their activities.	Consider ethical, legal, social and environmental aspects of scientific and engineering activities (LO3).	History and Philosophy of Science; Intellectual Property and Research; Sustainable Development Strategies

General and social competences Graduates		
meet all the requirements that are placed on graduates of a master's degree regarding key qualifications,	Demonstrate advanced professional, research, analytical, communication and managerial competences defined by the programme learning outcomes (LO1–LO9).	Materials Science and Technologies of Modern and Promising Materials, Materials Science and Technologies of Advanced Materials, Materials Research Methods, Modern Problems of Materials and Process Sciences, Foreign Language (Professional), Master's Thesis
are able to lead a cooperative and well-connected team,	Demonstrate teamwork, leadership and interpersonal communication skills in professional environments (LO3).	Psychology of Management; Psychology of Communication
are able to effectively work and communicate in a national and international context,	Communicate research results effectively and interact professionally in international environments using English language skills (LO3).	Foreign Language (Professional); Professional Training in English
are in a position to recognise and evaluate the social, ethical, ecological and economic preconditions and implications of their projects,	Assess environmental, ethical, social and economic impacts of engineering decisions and projects (LO3).	Sustainable Development Strategies; Intellectual Property and Research
are in a position to evaluate their projects regarding occupational safety and work conditions and take adequate precautions to prevent accidents,	Consider quality assurance, safety requirements and occupational risks in technological processes and materials production (LO4, LO8).	Technological Quality Assurance of Materials; High Technologies: From Research to Business

are able to situate their professional activities within a broader societal context and to take on current social challenges.	Address contemporary societal challenges through sustainable and responsible engineering solutions (LO3, LO6).	Sustainable Development Strategies; History and Philosophy of Science