

Code and title of specialty (programme subject area): 132 “Materials Science”

Title of specialization:

Code and title of the field of study: 13 “Mechanical Engineering”

Qualification: Master of Materials Science

Credits: 90 ECTS credits

Level of higher education: the second (master) level corresponds to the seventh qualification level of the National Qualifications Framework in Ukraine.

Requirements to the previous education level: a person has the right to acquire the master level in case he/she has obtained education of the bachelor level in any speciality. Given that the previous level has been obtained in the other country, nostrification is required.

Qualification requirements: higher education document is issued to a person who has successfully completed the educational programme and has been attested. Final attestation is carried out by evaluating the degree of maturity of competences. The form of attestation is state examination in professional courses and public defence of master’s thesis.

Programme learning outcomes: to use conceptual knowledge, including knowledge of modern achievements for solving complex unforeseen problems of the industry; to use theory, principles, methods and concepts of general engineering sciences in education and professional activity; to collect and interpret information and choose methods and tools to solve professional problems; to apply innovative approaches to solve professional problems; to inform specialists and non-specialists of information, ideas, problems, solutions and own experience in the field of professional activity; to manage complex actions or projects; to form a communication strategy; to use a foreign language for professional purposes; to be responsible for professional development of individuals and / or groups; to be responsible for decision-making under unpredictable conditions; to study with a high level of autonomy.

Teaching professional activity: to master methods of teaching in higher education establishment, based on the standards of the Bologna process; to plan and implement educational processes in higher education establishment using modern learning systems.

Research professional activity: to determine the relevance of topic, aims, objectives and methods of research, scientific novelty and practical value of future results, and develop a plan of research; to use mathematical tools for theoretical analysis of the studied characteristics; to collect and make a comparative analysis of existing data about types and brands of materials, their structure and properties, methods of developing new materials with desired technological and functional properties in relation to the set tasks using databases and literature; to participate in organizing and conducting projects, research and development of new materials and compositions, scientific and applied experiments in creation of new processes of obtaining and processing of materials and products; to develop programmes, work plans and techniques, to organize and conduct experiments, research and testing of materials, to process and analyse their results to develop technological recommendations during processes implementation into production, to prepare some tasks for performers; to prepare scientific and technical reports, surveys, publications on the results of research based on analysis and systematization of scientific, technical and patent information on research topic as well as feedbacks and opinions on projects, including standards; to model materials and processes, research and experimental verification of theoretical data to develop new manufacturing processes and materials processing; to analyse, justify and implement technical projects in the rational choice of materials under specified conditions while designing products, designing production processes, treatment and recycling of materials, non-traditional tools for testing materials, semi-finished and finished products.

Design and technology professional activities: to design tasks for development of design material science and technological decisions, to conduct patent research to provide patent clearance of new solutions and determine patentability and technical parameters of materials, products and processes; to design technological processes of production, processing and recycling of materials, equipment and devices as well as tooling of these processes, including use of automated design systems; to conduct feasibility analysis of alternative technological options;

to participate in certification of materials, semi-finished and finished products, processes of their production and processing; to conduct comprehensive technological and design calculations using software; to perform innovative material science and technology projects, to assess innovation risks during implementation of projects and implement new technologies, to participate in work of a multidisciplinary team of specialists during development of complex projects; to develop methodical documentation and regulations, technical documentation, proposals and measures concerning implementation of designed projects and programmes; to study causes of shortage in production and to develop proposals for its prevention and elimination, to develop measures for complex use of raw materials, replacement of scarce materials and finding ways to production waste disposal, to choose systems of providing technical and environmental production safety.

Organizational professional activities: to organize technological processes of production, processing and recycling of materials, evaluation and quality management, evaluation of economic efficiency of technological processes; to organize and enhance leadership of the primary production, design or research department, to operatively plan work of its staff, to analyse costs and performance results of the department, to choose scientific and technical, organizational and administrative decisions on department activities; to design documentation and organize work on quality control of technological processes at the enterprise and manufacturing areas, to organize the department work on improvement, modernization and unification of manufactured products, their components and drafting standards and certificates, to conduct certification of processes, equipment and materials, to participate in carrying out measures to create quality systems; to organize activities on supervision during manufacturing, installation, adjustment, testing and commissioning of products and objects; to conduct market research and prepare business plans for production and sales of competitive products and technologies, to develop plans and programmes of organizational innovative activities.

Management professional activities: to plan components of technological and organizational activities; to monitor components of technological and organizational activities; to improve components of technological and organizational activities; to manage production; to carry out work on quality management; to manage technological process, to provide technical and ecological safety of production within the professional activity.

Employment opportunities: Master in speciality 132 “Materials Science” can work in scientific and industrial, and scientific associations and organizations of any ownership, engaged in developing new materials, coatings and products, and using powder technology for ceramics and nano-ceramics; public and private secondary, and higher education establishments, to hold positions of:

2149.1 – researcher (civil engineering);

2310.2 – teacher of higher education establishment;

2320 – teacher of professional educational establishment;

1222.2 – heads and masters of manufacturing sites (units) in industry and can hold primary positions of:

scientific and engineering and technical staff in research and development academic and industrial institutes and laboratories, research and design offices and factory laboratories, scientific and production associations and industry:

junior researcher, engineer of II category, senior laboratory assistant, assistant, manager or agent on implementation of new models of equipment, materials and technology, teacher, assistant.

Further study prospects: Masters in speciality 132 “Materials Science” may continue their education in postgraduate studies on various materials science or technical fields for obtaining Ph.D. degree.

Department graduating a student with degree: Department of Town Planning, Municipal Facilities and Materials Science

Institute/Faculty: Institute of Transport and Logistics.

Educational programme supervisor: Associate Professor, Ph.D. in Technology Biloshtytskiy M.V., bud@snu.edu.ua; 0666279753.