

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF  
KAZAKHSTAN

SATBAYEV UNIVERSITY

(Kazakh National Research Technical University named after K.I. Satbayev)

**Module reference book or collection of module descriptions in the specialty**

**6B07109 "Engineering physics and material science"**

**Almaty 2025**

A module reference book or a collection of module descriptions, which is also available to students for review, should contain the following information about individual modules:

Module designation	<b>Module of Language Training</b>
Semester(s) in which the module is taught	<b>Autumn, spring (1,2)</b>
The person responsible for the module	Institute of Project Management Department of Foreign Languages Department of Kazakh and Russian languages
Language	Kazakh / Russian / English
Attitude to the curriculum	Mandatory module (General Education Disciplines Cycle – GED)
Teaching methods	Practical classes, independent work of students
Workload (including contact hours, self-study hours)	Total workload: 20 ECTS (600 hours) Approximate distribution: Contact hours (practical classes) – 180 hours Independent study – 420 hours
Credits	20 ECTS
Necessary and recommended prerequisites for joining the module	Secondary school level language proficiency.
Module objectives / expected learning outcomes	The aim of the module is to develop communicative competence necessary for academic and professional activities in engineering and materials science. Upon successful completion of the module, students will be able to: <ol style="list-style-type: none"> <li>1. Communicate effectively in oral and written form in Kazakh/Russian and English.</li> <li>2. Read and interpret academic and technical texts in engineering.</li> <li>3. Prepare structured written assignments (essays, reports, summaries).</li> <li>4. Deliver oral presentations on professional topics.</li> <li>5. Participate in discussions and teamwork communication.</li> <li>6. Use professional terminology related to engineering and materials science.</li> <li>7. Apply principles of academic integrity and correct citation.</li> </ol>
Description	This module focuses on the development of academic and professional communication skills required for engineering education and future professional activities. The content includes: <ul style="list-style-type: none"> <li>• Academic reading and writing</li> <li>• Professional vocabulary</li> <li>• Technical communication</li> <li>• Presentation skills</li> <li>• Professional correspondence</li> <li>• Academic integrity and referencing</li> </ul> Special attention is given to English for Specific Purposes (ESP) in the field of engineering and materials science.

Exams and assessment formats	<p>Assessment includes continuous and final evaluation.</p> <p>Continuous assessment:</p> <ul style="list-style-type: none"> <li>• Written assignments</li> <li>• Presentations</li> <li>• Vocabulary tests</li> <li>• Midterm examination</li> </ul> <p>Final assessment:</p> <ul style="list-style-type: none"> <li>• Written and/or oral examination</li> </ul> <p>Maximum final score: 40 points.</p>
Requirements for studies and exams	<p>Successful completion of the module requires continuous participation in coursework and successful completion of both intermediate and final assessments.</p> <p>The final grade for the module is calculated based on the results of current academic performance and the final examination.</p> <p>Current academic performance (admission rating) accounts for 60% of the final grade and includes quizzes, written assignments, class participation, and intermediate assessments conducted during the semester.</p> <p>The final examination accounts for 40% of the final grade.</p> <p>Admission to the final examination is granted to students who meet the following requirements:</p> <ul style="list-style-type: none"> <li>– obtain an admission rating of at least 25 points out of 60 based on current and mid-term assessments;</li> <li>– have no outstanding tuition fees;</li> <li>– attend at least 80% of classes (no more than 20% absences);</li> <li>– are not on academic leave;</li> <li>– have completed all required medical examinations (if applicable).</li> </ul> <p>The final grade is calculated as the sum of points obtained from current academic performance (maximum 60 points) and the final examination (maximum 40 points), resulting in a total maximum score of 100 points.</p> <p>To successfully pass the module, students must obtain a final score of at least 60 out of 100 points (60%).</p>
Reading list	<p><b>Core Literature</b></p> <ol style="list-style-type: none"> <li>1. Ibbotson, M. <i>Professional English in Use: Engineering</i>. Cambridge University Press.</li> <li>2. Glendinning, E., Pohl, A. <i>Technology for Engineering and Applied Sciences</i>. Oxford University Press.</li> <li>3. Hewings, M. <i>Advanced Grammar in Use</i>. Cambridge University Press.</li> <li>4. Oshima, A., Hogue, A. <i>Academic Writing for University Students</i>. Pearson Education.</li> </ol> <p><b>Additional Literature</b></p> <ol style="list-style-type: none"> <li>5. McCarthy, M., O'Dell, F. <i>Academic Vocabulary in Use</i>. Cambridge University Press.</li> <li>6. Rizvi, M.A. <i>Effective Technical Communication</i>. McGraw-Hill Education.</li> </ol>

Module designation	<b>Module of physical training</b>
Semester(s) in which the module is taught	<b>Autumn, spring (1,2,3,4)</b>
The person responsible for the module	The Department of Physical Culture
Language	Kazakh / Russian
Attitude to the curriculum	Mandatory module (General Education Disciplines Cycle – GED)
Teaching methods	Practical classes, independent work of students,
Workload (including contact hours, self-study hours)	Total workload: 8 ECTS (240 hours) Approximate distribution: Contact hours (practical classes) – 120 hours Independent study – 120 hours
Credits	8 ECTS
Necessary and recommended prerequisites for joining the module	No academic prerequisites required. Students must have medical clearance for participation in physical education activities.
Module objectives / expected learning outcomes	The aim of the module is to develop students' physical fitness, promote a healthy lifestyle, and form sustainable habits of regular physical activity. Upon successful completion of the module, students demonstrate an appropriate level of physical preparedness, are able to perform physical exercises safely and correctly, apply principles of a healthy lifestyle in everyday practice, work effectively in team-based sports activities, and independently maintain their physical fitness. The module contributes to students' overall well-being, stress management, and readiness for academic and professional activities.
Description	This module is focused on improving students' physical development, endurance, coordination, and overall health. It includes practical training sessions aimed at strengthening cardiovascular and muscular systems, developing flexibility and coordination, and forming basic sports skills. The content covers general physical training, athletics, team sports, strength and endurance exercises, and fundamentals of sports safety. The module also promotes awareness of healthy lifestyle principles and encourages students to integrate regular physical activity into their daily routine.
Exams and assessment formats	Assessment of the module includes continuous and final evaluation. During the semester, students complete intermediate assessments in written or oral form, short quizzes, and written assignments. Continuous assessment is aimed at evaluating students' understanding of the course material and their progress throughout the semester. The final assessment is conducted in the form of an oral or written examination. The examination may also be organized in a test format consisting of several sections, each allocated a specific amount of time and points at the instructor's discretion. The total time for completing the final examination does not exceed 120 minutes. The maximum score for the examination is 40 points.

	Students' performance is evaluated according to established academic criteria and university regulations.
Requirements for studies and exams	Successful completion of the module requires regular attendance and active participation in all scheduled classes, as well as timely completion of all assigned coursework and intermediate assessments. The final grade is calculated based on continuous assessment and the results of the final examination. Continuous assessment accounts for 60% of the final grade and includes quizzes, written assignments, class participation, and intermediate assessments conducted during the semester. The final examination accounts for 40% of the final grade. Admission to the final examination is granted to students who have obtained at least 25 points out of 60 in continuous assessment and have met the minimum attendance requirement of 80% of scheduled classes, in accordance with university regulations. To successfully pass the module, students must obtain at least 60 out of 100 total points.
Reading list	<ol style="list-style-type: none"> <li>1. Sharkey, B.J. Fitness and Health. Human Kinetics.</li> <li>2. American College of Sports Medicine. ACSM's Guidelines for Exercise Testing and Prescription.</li> </ol>

Module designation	<b>Module of socio-cultural development</b>
Semester(s) in which the module is taught	<b>Autumn, spring (2,3)</b>
The person responsible for the module	Department of Social Disciplines
Language	Kazakh / Russian
Attitude to the curriculum	Mandatory module (General Education Disciplines Cycle – GED)
Teaching methods	Lecture, practical classes, independent work of students
Workload (including contact hours, self-study hours)	Total workload: 18 ECTS (540 hours) Approximate distribution: Contact hours (lecture, practical classes) – 180 hours Independent study – 360 hours
Credits	18 ECTS
Necessary and recommended prerequisites for joining the module	No academic prerequisites required.
Module objectives / expected learning outcomes	The aim of the module is to develop students' understanding of social, cultural, philosophical, and political processes and to form civic responsibility and critical thinking skills. Upon completion of the module, students are able to analyze social and historical phenomena, explain key philosophical and political concepts, understand the role of cultural and national identity in society, apply ethical principles in professional and social contexts, and demonstrate awareness of social responsibility and sustainable development principles.
Description	This module provides students with fundamental knowledge in history, philosophy, sociology, political science, and cultural studies.

	It focuses on the development of critical thinking, civic awareness, and understanding of social and cultural processes in modern society. Students explore historical development, social structures, political systems, and philosophical foundations that shape contemporary global and national contexts. The module supports the formation of ethical values, intercultural competence, and responsible citizenship.
Exams and assessment formats	Assessment includes continuous and final evaluation. Continuous assessment consists of written assignments, presentations, participation in discussions, and intermediate tests. The final assessment is conducted in the form of a written or oral examination. Students' performance is evaluated according to established academic criteria and university regulations.
Requirements for studies and exams	Successful completion of the module requires active participation in coursework and completion of all intermediate assessments. Continuous assessment accounts for 60% of the final grade, and the final examination accounts for 40%. Students must obtain at least 60 out of 100 total points to pass the module and meet the minimum attendance requirement of 80%.
Reading list	<ol style="list-style-type: none"> <li>1. Giddens, A. Sociology. Polity Press.</li> <li>2. Law, S. The Philosophy Gym. Headline Publishing.</li> <li>3. Smith, A.D. National Identity. University of Nevada Press.</li> </ol>

Module designation	<b>Module of anti-corruption culture, ecology and life safety base</b>
Semester(s) in which the module is taught	<b>Autumn (3)</b>
The person responsible for the module	Department of Social Disciplines
Language	Kazakh / Russian
Attitude to the curriculum	Mandatory module (General Education Disciplines Cycle – GED Component of Choice)
Teaching methods	Lecture, practical classes, independent work of students
Workload (including contact hours, self-study hours)	Total workload: 25 ECTS (750 hours) Approximate distribution: Contact hours (lecture, practical classes) – 225 hours Independent study – 525 hours
Credits	25 ECTS
Necessary and recommended prerequisites for joining the module	No academic prerequisites required.
Module objectives / expected learning outcomes	The aim of the module is to develop students' legal awareness, ecological responsibility, economic literacy, and understanding of safety principles in professional and social activities. Upon completion of the module, students are able to explain the principles of anti-corruption legislation, demonstrate understanding of ethical and legal responsibility, apply basic economic and financial concepts, analyze

	environmental and safety risks, and use fundamental research methods in academic and professional contexts.
Description	This module provides foundational knowledge in anti-corruption culture, legal responsibility, economics, financial literacy, research methodology, and environmental and life safety principles. Students explore the legal framework regulating anti-corruption activities, economic and entrepreneurial fundamentals, financial decision-making, and environmental sustainability. The module also introduces safety standards and risk management principles relevant to professional engineering practice. It supports the formation of responsible citizenship, ethical behavior, and sustainable development awareness.
Exams and assessment formats	Assessment includes continuous and final evaluation. Continuous assessment consists of written assignments, case studies, presentations, and intermediate tests. The final assessment is conducted in the form of a written or oral examination. Students' performance is evaluated according to established academic criteria and university regulations.
Requirements for studies and exams	Successful completion of the module requires active participation in coursework and completion of all intermediate assessments. Continuous assessment accounts for 60% of the final grade, and the final examination accounts for 40%. Students must obtain at least 60 out of 100 total points to pass the module and meet the minimum attendance requirement of 80%.
Reading list	<ol style="list-style-type: none"> <li>1. Rose-Ackerman, S. Corruption and Government. Cambridge University Press.</li> <li>2. Samuelson, P., Nordhaus, W. Economics. McGraw-Hill.</li> <li>3. Mankiw, N.G. Principles of Economics. Cengage Learning.</li> <li>4. UNEP. Environmental Management Guidelines.</li> </ol>

Module designation	<b>Module of information technology</b>
Semester(s) in which the module is taught	<b>Spring (4)</b>
The person responsible for the module	Department of Software Engineering
Language	Kazakh / Russian
Attitude to the curriculum	Mandatory module (General Education Disciplines Cycle – GED Component of Choice)
Teaching methods	Lecture, laboratory classes, independent work of students
Workload (including contact hours, self-study hours)	Total workload: 5 ECTS (150 hours) Approximate distribution: Contact hours (lecture, laboratory classes) – 45 hours Independent study – 105 hours
Credits	5 ECTS

Necessary and recommended prerequisites for joining the module	Basic computer literacy at secondary school level.
Module objectives / expected learning outcomes	The aim of the module is to develop students' digital competence and ability to use information and communication technologies in academic and professional activities. Upon completion of the module, students are able to use modern software tools for data processing and analysis, apply information technologies for problem solving in engineering contexts, work with digital communication platforms, ensure information security, and effectively manage digital information resources.
Description	The module provides fundamental knowledge and practical skills in information and communication technologies. It includes topics such as operating systems, office software, data processing tools, basic programming concepts, information security, and digital communication technologies. Students learn to apply ICT tools for academic tasks, data analysis, and engineering-related problem solving. The module supports the development of digital literacy and prepares students for further technical coursework.
Exams and assessment formats	Assessment includes continuous and final evaluation. Continuous assessment consists of practical assignments, laboratory work, quizzes, and intermediate tests. The final assessment is conducted in the form of a written test and/or practical examination using computer-based tasks. Students' performance is evaluated according to established academic criteria and university regulations.
Requirements for studies and exams	Successful completion of the module requires participation in practical sessions and completion of all assigned coursework. Continuous assessment accounts for 60% of the final grade, and the final examination accounts for 40%. Students must obtain at least 60 out of 100 total points and meet the minimum attendance requirement of 80% to pass the module.
Reading list	<ol style="list-style-type: none"> <li>1. Shelly, G.B., Vermaat, M.E. Discovering Computers. Cengage Learning.</li> <li>2. Brookshear, J.G. Computer Science: An Overview. Pearson.</li> <li>3. Tanenbaum, A., Bos, H. Modern Operating Systems. Pearson.</li> <li>4. University-approved ICT course materials.</li> </ol>

Module designation	<b>Module of physical and mathematical training</b>
Semester(s) in which the module is taught	<b>Autumn, Spring (1–3 semesters)</b>
The person responsible for the module	Department of Management and Mathematical Economics Department of "General Physics"
Language	Kazakh / Russian / English

Attitude to the curriculum	Mandatory module (Cycle of Basic Disciplines – BD)
Teaching methods	Lecture, laboratory classes, practical classes, independent work of students
Workload (including contact hours, self-study hours)	Total workload: 20 ECTS (600 hours) Approximate distribution: Contact hours (lecture, laboratory classes, practical classes) – 180 hours Independent study – 420 hours
Credits	20 ECTS
Necessary and recommended prerequisites for joining the module	Secondary school knowledge of mathematics and physics.
Module objectives / expected learning outcomes	The aim of the module is to provide students with fundamental knowledge in mathematics and physics necessary for further study in engineering and materials science. Upon completion of the module, students are able to apply mathematical methods to solve engineering problems, use differential and integral calculus, analyze algebraic and numerical models, explain fundamental physical laws and principles, solve basic physical problems in mechanics, electromagnetism and modern physics, and interpret experimental data using mathematical tools. The module forms the analytical and quantitative foundation required for advanced technical disciplines.
Description	This module provides fundamental theoretical and practical training in mathematics and physics. The mathematical component includes calculus, linear algebra, differential equations, and basic numerical methods. The physics component covers mechanics, molecular physics, electromagnetism, optics, and elements of modern physics. Special attention is given to the application of mathematical methods for modeling and solving physical and engineering problems. The module supports the development of analytical thinking and problem-solving skills essential for materials science and engineering studies.
Exams and assessment formats	Assessment includes continuous and final evaluation. Continuous assessment consists of problem-solving assignments, laboratory reports (for physics), quizzes, and intermediate tests. The final assessment is conducted in the form of a written examination. Students' performance is evaluated according to established academic criteria and university regulations.
Requirements for studies and exams	Successful completion of the module requires active participation in lectures and practical sessions, completion of laboratory work (for physics), and submission of all assigned coursework. Continuous assessment accounts for 60% of the final grade, and the final examination accounts for 40%. Students must obtain at least 60 out of 100 total points and

	meet the minimum attendance requirement of 80% to pass the module.
Reading list	<p><i>Mathematics</i></p> <ol style="list-style-type: none"> <li>1. Stewart, J. Calculus: Early Transcendentals. Cengage Learning.</li> <li>2. Lay, D., Lay, S., McDonald, J. Linear Algebra and Its Applications. Pearson.</li> </ol> <p><i>Physics</i></p> <ol style="list-style-type: none"> <li>3. Halliday, D., Resnick, R., Walker, J. Fundamentals of Physics. Wiley.</li> <li>4. Serway, R., Jewett, J. Physics for Scientists and Engineers. Cengage Learning.</li> </ol>

Module designation	<b>Basic general technical training module</b>
Semester(s) in which the module is taught	<b>Spring (4)</b>
The person responsible for the module	"Chemical Processes and Industrial Ecology" Department
Language	Kazakh / Russian / English
Attitude to the curriculum	Mandatory module (Cycle of Basic Disciplines – BD)
Teaching methods	Lecture, laboratory classes, independent work of students
Workload (including contact hours, self-study hours)	Total workload: 5 ECTS (150 hours) Approximate distribution: Contact hours (lecture, laboratory classes) – 45 hours Independent study – 105 hours
Credits	5 ECTS
Necessary and recommended prerequisites for joining the module	Secondary school knowledge of chemistry and mathematics.
Module objectives / expected learning outcomes	The aim of the module is to provide students with fundamental knowledge of general chemistry necessary for engineering and materials science studies. Upon completion of the module, students are able to explain basic chemical laws and principles, describe atomic structure and chemical bonding, analyze chemical reactions and thermodynamic processes, perform laboratory experiments safely, interpret experimental results, and apply chemical knowledge to engineering and materials-related problems.
Description	This module introduces fundamental concepts of general chemistry, including atomic structure, periodic properties of elements, chemical bonding, stoichiometry, thermodynamics, kinetics, and basic electrochemistry. Laboratory work develops practical skills in conducting chemical experiments, handling laboratory equipment, and analyzing experimental data. The module forms the chemical foundation required for further study in materials science, metallurgy, nanotechnology, and related engineering disciplines.

Exams and assessment formats	Assessment includes continuous and final evaluation. Continuous assessment consists of laboratory reports, quizzes, written assignments, and intermediate tests. The final assessment is conducted in the form of a written examination. Students' performance is evaluated according to established academic criteria and university regulations.
Requirements for studies and exams	Successful completion of the module requires participation in lectures and laboratory classes, submission of all laboratory reports, and completion of assigned coursework. Continuous assessment accounts for 60% of the final grade, and the final examination accounts for 40%. Students must obtain at least 60 out of 100 total points and meet the minimum attendance requirement of 80% to pass the module.
Reading list	<ol style="list-style-type: none"> <li>1. Brown, T., LeMay, H., Bursten, B. Chemistry: The Central Science. Pearson.</li> <li>2. Petrucci, R., Herring, F., Madura, J. General Chemistry. Pearson.</li> <li>3. Atkins, P., de Paula, J. Atkins' Physical Chemistry. Oxford University Press.</li> </ol>

Module designation	<b>Materials Science Module</b>
Semester(s) in which the module is taught	<b>Autumn, Spring (2–6 semesters)</b>
The person responsible for the module	Kakimov U.K., Paltusheva Zh.U, Ybyrayimkul D.T., Imash A.A., Beisebaeva A.S.
Language	Kazakh / Russian / English
Attitude to the curriculum	Mandatory and elective disciplines (Cycle of Basic Disciplines – BD)
Teaching methods	Lecture, laboratory classes, practical classes, independent work of students
Workload (including contact hours, self-study hours)	Total workload: 40 ECTS (1200 hours) Approximate distribution: Contact hours (lecture, laboratory classes, practical classes) – 480 hours Independent study – 720 hours
Credits	40 ECTS
Necessary and recommended prerequisites for joining the module	Physics Mathematics General Chemistry
Module objectives / expected learning outcomes	The aim of the module is to provide students with fundamental knowledge of the structure, properties, and behavior of engineering materials. Upon completion of the module, students are able to explain structure–property relationships in metals, alloys, polymers, ceramics, and composite materials; analyze phase transformations and microstructural features; apply methods of materials characterization; evaluate mechanical and

	physical properties of materials; select appropriate materials for engineering applications; and understand the influence of environmental factors such as corrosion on material performance. Students also develop basic understanding of intellectual property regulation and sustainable development principles in materials engineering.
Description	This module forms the core of the materials science component of the program. It introduces theoretical and practical aspects of metallic, polymeric, ceramic, and composite materials. Topics include crystal structure, defects, phase diagrams, mechanical behavior, heat treatment, corrosion processes, and microstructural analysis. Students study modern engineering materials and their applications in industry. Laboratory work and practical training develop skills in materials testing, metallographic analysis, and evaluation of material properties. The module establishes the foundation for advanced studies in nanotechnology, functional materials, and engineering applications.
Exams and assessment formats	Assessment includes continuous and final evaluation. Continuous assessment consists of laboratory reports, practical assignments, written tests, presentations, and intermediate examinations. The final assessment is conducted in the form of a written or oral examination, depending on the discipline. Students' performance is evaluated according to established academic criteria and university regulations.
Requirements for studies and exams	Successful completion of the module requires participation in lectures and laboratory classes, submission of laboratory reports, and completion of assigned coursework. Continuous assessment accounts for 60% of the final grade, and the final examination accounts for 40%. Students must obtain at least 60 out of 100 total points and meet the minimum attendance requirement of 80% to pass the module.
Reading list	<ol style="list-style-type: none"> <li>1. Callister, W.D., Rethwisch, D.G. Materials Science and Engineering: An Introduction. Wiley.</li> <li>2. Ashby, M., Jones, D. Engineering Materials 1 &amp; 2. Butterworth-Heinemann.</li> <li>3. Smith, W., Hashemi, J. Foundations of Materials Science and Engineering. McGraw-Hill.</li> <li>4. Dieter, G., Bacon, D. Mechanical Metallurgy. McGraw-Hill.</li> <li>5. ASM Handbook (selected volumes).</li> </ol>

Module designation	<b>Materials Science Module</b>
Semester(s) in which the module is taught	<b>Autumn (7 semester)</b>

The person responsible for the module	Baytimbetova B.A.
Language	Kazakh / Russian / English
Attitude to the curriculum	Mandatory and elective disciplines (Cycle of Basic and Profile Disciplines – BD / PD)
Teaching methods	Lecture, laboratory classes, practical classes, independent work of students
Workload (including contact hours, self-study hours)	Total workload: 30 ECTS (540 hours) Approximate distribution: Contact hours (lecture, laboratory classes, practical classes) – 180 hours Independent study – 360 hours
Credits	30 ECTS
Necessary and recommended prerequisites for joining the module	Physics Mathematics Fundamentals of Materials Science
Module objectives / expected learning outcomes	The aim of the module is to provide students with advanced fundamental knowledge of physical principles underlying materials behavior and modern engineering technologies. Upon completion of the module, students are able to explain physical processes in solids, analyze electrical and magnetic phenomena, describe properties of low-dimensional and semiconductor systems, apply experimental methods for materials investigation, interpret measurement results, and solve engineering problems based on physical laws. The module develops analytical thinking and supports further specialization in materials science and nanotechnology.
Description	This module focuses on the physical foundations of materials and engineering systems. It includes topics such as electricity and magnetism, solid-state physics, low-dimensional systems, reactor materials science, measurement methods, and modern techniques for materials investigation. Students gain theoretical knowledge and practical skills in analyzing physical processes relevant to advanced materials and technological applications. Laboratory and practical components develop competencies in experimental methods and data interpretation.
Exams and assessment formats	Assessment includes continuous and final evaluation. Continuous assessment consists of laboratory reports, problem-solving assignments, written tests, and intermediate examinations. The final assessment is conducted in the form of a written or oral examination, depending on the discipline. Students' performance is evaluated according to established academic criteria and university regulations.
Requirements for studies and exams	Successful completion of the module requires participation in lectures and laboratory classes, submission of laboratory reports, and completion of assigned coursework. Continuous assessment accounts for 60% of the final grade, and the final examination accounts for 40%. Students must obtain at least

	60 out of 100 total points and meet the minimum attendance requirement of 80% to pass the module.
Reading list	<ol style="list-style-type: none"> <li>1. Kittel, C. Introduction to Solid State Physics. Wiley.</li> <li>2. Ashcroft, N., Mermin, N. Solid State Physics. Brooks Cole.</li> <li>3. Serway, R., Jewett, J. Physics for Scientists and Engineers. Cengage Learning.</li> <li>4. Cullity, B., Stock, S. Elements of X-Ray Diffraction. Pearson.</li> </ol>

Module designation	<b>Module of engineering physics</b>
Semester(s) in which the module is taught	<b>Spring (6 semester)</b>
The person responsible for the module	Beisebaeva A.S., Baytimbetova B.A., Imash A.A.
Language	Kazakh / Russian / English
Attitude to the curriculum	Mandatory and elective disciplines (Cycle of Basic and Profile Disciplines – BD / PD)
Teaching methods	Lecture, laboratory classes, independent work of students
Workload (including contact hours, self-study hours)	Total workload: 5 ECTS (150 hours) Approximate distribution: Contact hours (lecture, laboratory classes) – 45 hours Independent study – 360 hours
Credits	5 ECTS
Necessary and recommended prerequisites for joining the module	Physics Mathematics Fundamentals of Materials Science
Module objectives / expected learning outcomes	The aim of the module is to provide students with fundamental knowledge of physical principles underlying engineering systems, with particular emphasis on electricity and magnetism. Upon completion of the module, students are able to explain electric and magnetic fields, analyze electromagnetic phenomena, apply Maxwell's equations in simplified form, solve problems related to electric circuits and magnetic systems, describe the behavior of materials in electric and magnetic fields, and interpret experimental results obtained in laboratory conditions. Students are also able to apply physical laws to practical engineering problems in materials science and related fields.
Description	This module focuses on the physical foundations of engineering systems, with particular attention to electricity and magnetism. The content includes electrostatics, electric current, DC and AC circuits, magnetic fields, electromagnetic induction, Maxwell's equations (introductory level), and electromagnetic waves. The module also covers elements of solid-state physics and measurement methods relevant to engineering applications. Laboratory and practical sessions develop students' skills in

	electrical measurements, circuit analysis, and interpretation of experimental data. The module forms the physical basis for further study in electronics, nanotechnology, semiconductor materials, and advanced materials engineering.
Exams and assessment formats	Assessment includes continuous and final evaluation. Continuous assessment consists of laboratory reports, practical assignments, written tests, and intermediate examinations. The final assessment is conducted in the form of a written or oral examination, depending on the discipline. Evaluation is carried out according to established academic criteria and university regulations.
Requirements for studies and exams	Successful completion of the module requires participation in lectures and laboratory classes, submission of laboratory reports, and completion of assigned coursework. Continuous assessment accounts for 60% of the final grade, and the final examination accounts for 40%. Students must obtain at least 60 out of 100 total points and meet the minimum attendance requirement of 80% to pass the module.
Reading list	<ol style="list-style-type: none"> <li>1. Halliday, D., Resnick, R., Walker, J. Fundamentals of Physics. Wiley.</li> <li>2. Serway, R.A., Jewett, J.W. Physics for Scientists and Engineers. Cengage Learning.</li> <li>3. Griffiths, D.J. Introduction to Electrodynamics. Cambridge University Press.</li> <li>4. Young, H.D., Freedman, R.A. University Physics with Modern Physics. Pearson.</li> </ol>

Module designation	<b>Nanotechnology module</b>
Semester(s) in which the module is taught	<b>Autumn, Spring (5, 6 semester)</b>
The person responsible for the module	Kakimov U.K., Baytimbetova B.A., Kudaibergenov K.K.
Language	Kazakh / Russian / English
Attitude to the curriculum	Mandatory and elective disciplines (Cycle of Basic and Profile Disciplines – BD / PD)
Teaching methods	Lecture, laboratory classes, practical classes, independent work of students
Workload (including contact hours, self-study hours)	Total workload: 30 ECTS (1050 hours) Approximate distribution: Contact hours (lecture, laboratory classes, practical classes) – 315 hours Independent study – 735 hours
Credits	30 ECTS
Necessary and recommended prerequisites for joining the module	Physics Mathematics Materials Science Engineering Physics

Module objectives / expected learning outcomes	The aim of the module is to provide students with fundamental knowledge of nanomaterials, nanostructures, and nanotechnologies used in modern engineering applications. Upon completion of the module, students are able to explain size-dependent physical properties of nanomaterials, describe synthesis and fabrication methods of nanostructures, analyze surface phenomena at the nanoscale, apply characterization techniques for nanomaterials, use basic computational modeling tools in materials science, and evaluate applications of nanotechnology in electronics, energy systems, and advanced functional materials.
Description	This module focuses on the scientific principles and technological applications of nanomaterials and nanostructured systems. It covers nanoscale phenomena, surface effects, quantum size effects, synthesis methods (chemical, physical, and technological processes), and characterization techniques such as electron microscopy and spectroscopy. Students study advanced materials including graphene-based materials, semiconductor nanostructures, and nanomaterials for energy applications. Practical and laboratory components develop skills in nanomaterial preparation, analysis, and interpretation of experimental results. The module provides a foundation for modern materials engineering and high-technology industries.
Exams and assessment formats	Assessment includes continuous and final evaluation. Continuous assessment consists of laboratory reports, practical assignments, computational tasks, presentations, and intermediate examinations. The final assessment is conducted in the form of a written or oral examination. Students' performance is evaluated according to established academic criteria and university regulations.
Requirements for studies and exams	Successful completion of the module requires participation in lectures and laboratory classes, submission of laboratory reports, and completion of assigned coursework. Continuous assessment accounts for 60% of the final grade, and the final examination accounts for 40%. Students must obtain at least 60 out of 100 total points and meet the minimum attendance requirement of 80% to pass the module.
Reading list	<ol style="list-style-type: none"> <li>1. Poole, C.P., Owens, F.J. Introduction to Nanotechnology. Wiley.</li> <li>2. Cao, G., Wang, Y. Nanostructures and Nanomaterials: Synthesis, Properties and Applications. World Scientific.</li> <li>3. Bhushan, B. Springer Handbook of Nanotechnology. Springer.</li> <li>4. Novoselov, K., Fal'ko, V. et al. Selected publications on graphene and 2D materials (recommended journal articles).</li> </ol>

Module designation	<b>Practice-oriented module</b>
Semester(s) in which the module is taught	<b>Spring (2 semester)</b>
The person responsible for the module	Ybyrayimkul D.T.
Language	Kazakh / Russian / English
Attitude to the curriculum	Mandatory and elective disciplines (Cycle of Basic and Profile Disciplines – BD / PD)
Teaching methods	Practical training at university and/or enterprise, Independent work and reporting
Workload (including contact hours, self-study hours)	Total workload: 2 ECTS
Credits	2 ECTS
Necessary and recommended prerequisites for joining the module	Completion of core courses in Physics, Mathematics, Chemistry, and Materials Science Successful completion of laboratory-based disciplines
Module objectives / expected learning outcomes	The aim of the module is to provide students with practical experience in professional engineering activities and to develop applied skills relevant to materials science and engineering. Upon completion of the module, students are able to apply theoretical knowledge in real working environments, operate laboratory and industrial equipment, follow safety regulations, analyze technological processes, prepare technical documentation, and present the results of practical work in the form of reports.
Description	This module includes academic and industrial practice aimed at integrating theoretical knowledge with practical skills. Students gain experience in laboratories, research centers, or industrial enterprises related to materials science, metallurgy, nanotechnology, or engineering production. The practice involves participation in technological processes, materials testing, quality control, data analysis, and preparation of technical documentation. The module promotes professional responsibility, teamwork, and understanding of real industrial conditions.
Exams and assessment formats	Assessment is based on practical performance, supervisor evaluation, internship reports, and oral defense of the practice results. Students are evaluated according to established academic and professional criteria.
Requirements for studies and exams	Successful completion of the module requires full completion of the assigned practice program, submission of a written report, and successful defense of the practice results. Students must meet the requirements established by the university and the host organization. The final grade is assigned based on the evaluation of practical performance and report defense.
Reading list	1. ASM International. ASM Handbook (selected volumes).

	<p>2. Dieter, G. Engineering Design: A Materials and Processing Approach. McGraw-Hill.</p> <p>3. University internship guidelines and safety regulations.</p>
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Module designation	<b>Materials Science Module</b>
Semester(s) in which the module is taught	<b>Autumn, Spring (4, 5, 7 semester)</b>
The person responsible for the module	Kudaibergenov K.K., Paltusheva Zh.U, , Ybyrayimkul D.T.
Language	Kazakh / Russian / English
Attitude to the curriculum	Profile Disciplines Cycle (PD) – Mandatory and Elective Components
Teaching methods	Lecture, laboratory classes, practical classes, independent work of students
Workload (including contact hours, self-study hours)	Total workload: 30 ECTS (1080 hours) Approximate distribution: Contact hours (lecture, laboratory classes, practical classes) – 330 hours Independent study – 750 hours
Credits	30 ECTS
Necessary and recommended prerequisites for joining the module	Materials Science Module (BD) Engineering Physics General Chemistry Mathematics
Module objectives / expected learning outcomes	The aim of the module is to develop advanced professional competencies in materials science and engineering applications. Upon completion of the module, students are able to analyze mechanical and physical properties of engineering materials, apply heat and chemical-thermal treatment methods, interpret phase diagrams, select materials based on functional and technological requirements, evaluate material performance under operational conditions, and apply measurement and quality control methods in industrial practice. Students are also able to justify material selection for specific engineering applications using scientific and technical criteria.
Description	This module represents the core professional training in materials science at the advanced undergraduate level. It focuses on mechanical behavior, functional properties, heat treatment technologies, phase transformations, powder metallurgy, and material selection principles. Students study modern engineering materials used in metallurgy, construction, electronics, and high-technology industries. Laboratory and practical components develop skills in materials testing, structural analysis, quality control, and technological process evaluation. The module prepares students for professional engineering practice and further specialization.

Exams and assessment formats	Assessment includes continuous and final evaluation. Continuous assessment consists of laboratory reports, practical assignments, case studies, presentations, and intermediate examinations. The final assessment is conducted in the form of a written or oral examination. Evaluation is carried out according to established academic criteria and university regulations.
Requirements for studies and exams	Successful completion of the module requires participation in lectures and laboratory classes, submission of laboratory reports, and completion of assigned coursework. Continuous assessment accounts for 60% of the final grade, and the final examination accounts for 40%. Students must obtain at least 60 out of 100 total points and meet the minimum attendance requirement of 80% to pass the module.
Reading list	<ol style="list-style-type: none"> <li>1. Callister, W.D., Rethwisch, D.G. Materials Science and Engineering: An Introduction. Wiley.</li> <li>2. Ashby, M., Jones, D. Engineering Materials. Butterworth-Heinemann.</li> <li>3. Dieter, G., Bacon, D. Mechanical Metallurgy. McGraw-Hill.</li> <li>4. ASM International. ASM Handbook (selected volumes on heat treatment, mechanical properties, and materials selection).</li> </ol>

Module designation	<b>Module of engineering physics</b>
Semester(s) in which the module is taught	<b>Autumn, Spring (5, 7 semester)</b>
The person responsible for the module	Baytimbetova B.A.
Language	Kazakh / Russian / English
Attitude to the curriculum	Mandatory and elective disciplines (Cycle of Basic and Profile Disciplines – BD / PD)
Teaching methods	Lecture, laboratory classes, practical classes, independent work of students
Workload (including contact hours, self-study hours)	Total workload: 11 ECTS (330 hours) Approximate distribution: Contact hours (lecture, laboratory classes, practical classes) – 105 hours Independent study – 225 hours
Credits	11 ECTS
Necessary and recommended prerequisites for joining the module	Physics Mathematics Fundamentals of Materials Science
Module objectives / expected learning outcomes	The aim of the module is to provide students with fundamental and applied knowledge of physical principles that form the basis of modern engineering systems. Upon completion of the module, students are able to analyze electrical and magnetic

	phenomena, explain the behavior of materials in electric and magnetic fields, apply fundamental laws of electromagnetism and solid-state physics, solve engineering problems using physical and mathematical models, perform experimental measurements, and interpret obtained data. The module develops analytical thinking and supports further specialization in materials science, nanotechnology, and advanced engineering applications.
Description	This module focuses on the physical foundations of engineering and materials systems, with particular emphasis on electricity and magnetism. The content includes electrostatics, electric circuits, magnetic fields, electromagnetic induction, introductory Maxwell's equations, and basic electromagnetic wave concepts. Additional topics include elements of solid-state physics, semiconductor materials, and modern measurement methods used in engineering practice. Laboratory and practical sessions develop students' skills in circuit analysis, electrical measurements, and interpretation of experimental results. The module forms the physical basis for advanced courses in nanotechnology, semiconductor physics, and functional materials.
Exams and assessment formats	Assessment includes continuous and final evaluation. Continuous assessment consists of laboratory reports, problem-solving assignments, quizzes, and intermediate examinations. The final assessment is conducted in the form of a written or oral examination. Students' performance is evaluated according to established academic criteria and university regulations..
Requirements for studies and exams	Successful completion of the module requires participation in lectures and laboratory classes, submission of laboratory reports, and completion of assigned coursework. Continuous assessment accounts for 60% of the final grade, and the final examination accounts for 40%. Students must obtain at least 60 out of 100 total points and meet the minimum attendance requirement of 80% to pass the module.
Reading list	<ol style="list-style-type: none"> <li>1. Halliday, D., Resnick, R., Walker, J. Fundamentals of Physics. Wiley.</li> <li>2. Serway, R.A., Jewett, J.W. Physics for Scientists and Engineers. Cengage Learning.</li> <li>3. Griffiths, D.J. Introduction to Electrodynamics. Cambridge University Press.</li> <li>4. Kittel, C. Introduction to Solid State Physics. Wiley.</li> </ol>

Module designation	<b>Module of engineering physics</b>
Semester(s) in which the module is taught	<b>Autumn, Spring (5, 7 semester)</b>
The person responsible for the module	Ybyrayimkul D.T., Nugymanova K.N., Baytimbetova B.A.

Language	Kazakh / Russian / English
Attitude to the curriculum	Mandatory and elective disciplines (Cycle of Basic and Profile Disciplines – BD / PD)
Teaching methods	Lecture, laboratory classes, practical classes, independent work of students
Workload (including contact hours, self-study hours)	Total workload: 12 ECTS (360 hours) Approximate distribution: Contact hours (lecture, laboratory classes, practical classes) – 135 hours Independent study – 225 hours
Credits	12 ECTS
Necessary and recommended prerequisites for joining the module	Physics Mathematics Fundamentals of Materials Science
Module objectives / expected learning outcomes	The aim of the module is to provide students with fundamental and applied knowledge of physical principles that form the basis of modern engineering systems. Upon completion of the module, students are able to analyze electrical and magnetic phenomena, explain the behavior of materials in electric and magnetic fields, apply fundamental laws of electromagnetism and solid-state physics, solve engineering problems using physical and mathematical models, perform experimental measurements, and interpret obtained data. The module develops analytical thinking and supports further specialization in materials science, nanotechnology, and advanced engineering applications.
Description	This module focuses on the physical foundations of engineering and materials systems, with particular emphasis on electricity and magnetism. The content includes electrostatics, electric circuits, magnetic fields, electromagnetic induction, introductory Maxwell's equations, and basic electromagnetic wave concepts. Additional topics include elements of solid-state physics, semiconductor materials, and modern measurement methods used in engineering practice. Laboratory and practical sessions develop students' skills in circuit analysis, electrical measurements, and interpretation of experimental results. The module forms the physical basis for advanced courses in nanotechnology, semiconductor physics, and functional materials.
Exams and assessment formats	Assessment includes continuous and final evaluation. Continuous assessment consists of laboratory reports, problem-solving assignments, quizzes, and intermediate examinations. The final assessment is conducted in the form of a written or oral examination. Students' performance is evaluated according to established academic criteria and university regulations..
Requirements for studies and exams	Successful completion of the module requires participation in lectures and laboratory classes, submission of laboratory reports, and completion of assigned coursework. Continuous

	assessment accounts for 60% of the final grade, and the final examination accounts for 40%. Students must obtain at least 60 out of 100 total points and meet the minimum attendance requirement of 80% to pass the module.
Reading list	<ol style="list-style-type: none"> <li>1. Halliday, D., Resnick, R., Walker, J. Fundamentals of Physics. Wiley.</li> <li>2. Serway, R.A., Jewett, J.W. Physics for Scientists and Engineers. Cengage Learning.</li> <li>3. Griffiths, D.J. Introduction to Electrodynamics. Cambridge University Press.</li> <li>4. Kittel, C. Introduction to Solid State Physics. Wiley.</li> </ol>

Module designation	<b>Module of engineering physics</b>
Semester(s) in which the module is taught	<b>Autumn, Spring (7, 8 semester)</b>
The person responsible for the module	Aimaganbetov K.P., Nugymanova K.N., Baytimbetova B.A.
Language	Kazakh / Russian / English
Attitude to the curriculum	Mandatory and elective disciplines (Cycle of Basic and Profile Disciplines – BD / PD)
Teaching methods	Lecture, laboratory classes, practical classes, independent work of students
Workload (including contact hours, self-study hours)	Total workload: 29 ECTS (870 hours) Approximate distribution: Contact hours (lecture, laboratory classes, practical classes) – 270 hours Independent study – 600 hours
Credits	29 ECTS
Necessary and recommended prerequisites for joining the module	Physics Mathematics Materials Science Engineering Physics
Module objectives / expected learning outcomes	The aim of the module is to provide students with fundamental knowledge of nanomaterials and nanostructured systems used in modern engineering applications. Upon completion of the module, students are able to explain size-dependent physical and chemical properties of nanomaterials, describe synthesis and fabrication methods of nanostructures, analyze surface and interface phenomena at the nanoscale, apply basic characterization techniques for nanomaterials, and evaluate applications of nanotechnology in electronics, energy systems, and advanced functional materials. Students also gain introductory experience in computational modeling relevant to materials science.
Description	This module focuses on scientific principles and technological applications of nanomaterials and nanostructures. It includes

	nanoscale phenomena, quantum size effects, surface effects, synthesis methods (chemical and physical approaches), and basic characterization techniques such as electron microscopy and spectroscopy. Students study materials such as graphene-based systems, semiconductor nanostructures, and nanomaterials for energy and electronic applications. Laboratory and practical components develop skills in preparation, analysis, and interpretation of nanomaterial properties. The module supports the development of competencies required for modern materials engineering and high-technology industries.
Exams and assessment formats	Assessment includes continuous and final evaluation. Continuous assessment consists of laboratory reports, practical assignments, presentations, computational tasks, and intermediate tests. The final assessment is conducted in the form of a written or oral examination. Evaluation is carried out according to established academic criteria and university regulations.
Requirements for studies and exams	Successful completion of the module requires participation in lectures and laboratory classes, submission of laboratory reports, and completion of assigned coursework. Continuous assessment accounts for 60% of the final grade, and the final examination accounts for 40%. Students must obtain at least 60 out of 100 total points and meet the minimum attendance requirement of 80% to pass the module.
Reading list	<ol style="list-style-type: none"> <li>1. Poole, C.P., Owens, F.J. Introduction to Nanotechnology. Wiley.</li> <li>2. Cao, G., Wang, Y. Nanostructures and Nanomaterials: Synthesis, Properties and Applications. World Scientific.</li> <li>3. Bhushan, B. Springer Handbook of Nanotechnology. Springer.</li> <li>4. Tiwari, A., Tiwari, A. (eds.). Handbook of Nanomaterials. CRC Press.</li> </ol>

Module designation	<b>Module of R&amp;D</b>
Semester(s) in which the module is taught	<b>Spring ( 8 semester)</b>
The person responsible for the module	Kakimov U.K.
Language	Kazakh / Russian / English
Attitude to the curriculum	Profile Disciplines Cycle (PD) – Mandatory and Elective Components
Teaching methods	Lecture, laboratory classes, practical classes, independent work of students

Workload (including contact hours, self-study hours)	Total workload: 10 ECTS (300 hours) Approximate distribution: Contact hours (lecture, laboratory classes, practical classes) – 90 hours Independent study – 210 hours
Credits	10 ECTS
Necessary and recommended prerequisites for joining the module	Materials Science Module Engineering Physics Nanotechnology Module Completion of core laboratory-based disciplines
Module objectives / expected learning outcomes	The aim of the module is to develop students' research competencies and ability to apply scientific methods in materials science and engineering. Upon completion of the module, students are able to apply modern experimental methods for materials characterization, perform microstructural analysis using techniques such as X-ray diffraction and electron microscopy, analyze and interpret experimental data, prepare technical and research reports, and present research results in written and oral form. The module supports the development of analytical thinking and preparation for final qualification work.
Description	This module focuses on research-oriented training in materials science. It includes advanced methods of materials characterization, such as microstructural analysis of inorganic and composite materials, X-ray diffraction techniques, and electron microscopy. Students gain practical experience in laboratory-based research, data processing, and interpretation of results. The module integrates theoretical knowledge with experimental practice and prepares students for independent research activities and final attestation.
Exams and assessment formats	Assessment includes continuous evaluation of laboratory and research activities, submission of research reports, presentations, and intermediate tests. The final assessment may be conducted in the form of a written examination or project/report defense. Evaluation is carried out according to established academic criteria and university regulations.
Requirements for studies and exams	Successful completion of the module requires participation in laboratory and research sessions, submission of all assigned reports, and successful presentation of research results. Continuous assessment accounts for 60% of the final grade, and the final assessment accounts for 40%. Students must obtain at least 60 out of 100 total points to pass the module.
Reading list	<ol style="list-style-type: none"> <li>1. Cullity, B.D., Stock, S.R. Elements of X-Ray Diffraction. Pearson.</li> <li>2. Williams, D.B., Carter, C.B. Transmission Electron Microscopy. Springer.</li> <li>3. Goldstein, J. et al. Scanning Electron Microscopy and X-ray Microanalysis. Springer.</li> <li>4. ASM Handbook, Volumes on Materials Characterization.</li> </ol>

Module designation	<b>Practice-oriented module</b>
Semester(s) in which the module is taught	<b>Spring (4, 6 semester)</b>
The person responsible for the module	Ybyrayimkul D.T.
Language	Kazakh / Russian / English
Attitude to the curriculum	Mandatory and elective disciplines (Cycle of Basic and Profile Disciplines – BD / PD)
Teaching methods	Practical training at university and/or enterprise, Independent work and reporting
Workload (including contact hours, self-study hours)	Total workload: 5 ECTS
Credits	5 ECTS
Necessary and recommended prerequisites for joining the module	Completion of core courses in Physics, Mathematics, Chemistry, and Materials Science Successful completion of laboratory-based disciplines
Module objectives / expected learning outcomes	The aim of the module is to provide students with practical experience in professional engineering activities and to develop applied skills relevant to materials science and engineering. Upon completion of the module, students are able to apply theoretical knowledge in real working environments, operate laboratory and industrial equipment, follow safety regulations, analyze technological processes, prepare technical documentation, and present the results of practical work in the form of reports.
Description	This module includes academic and industrial practice aimed at integrating theoretical knowledge with practical skills. Students gain experience in laboratories, research centers, or industrial enterprises related to materials science, metallurgy, nanotechnology, or engineering production. The practice involves participation in technological processes, materials testing, quality control, data analysis, and preparation of technical documentation. The module promotes professional responsibility, teamwork, and understanding of real industrial conditions.
Exams and assessment formats	Assessment is based on practical performance, supervisor evaluation, internship reports, and oral defense of the practice results. Students are evaluated according to established academic and professional criteria.
Requirements for studies and exams	Successful completion of the module requires full completion of the assigned practice program, submission of a written report, and successful defense of the practice results. Students must meet the requirements established by the university and the host organization. The final grade is assigned based on the evaluation of practical performance and report defense.

Reading list	<ol style="list-style-type: none"> <li>1. ASM International. ASM Handbook (selected volumes).</li> <li>2. Dieter, G. Engineering Design: A Materials and Processing Approach. McGraw-Hill.</li> <li>3. University internship guidelines and safety regulations.</li> </ol>
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Module designation	<b>Module of final attestation</b>
Semester(s) in which the module is taught	<b>Spring (8 semester)</b>
The person responsible for the module	Kakimov U.K.
Language	Kazakh / Russian / English
Attitude to the curriculum	Final Attestation (FA) – Mandatory Component
Teaching methods	Practical training at university and/or enterprise, Independent work and reporting
Workload (including contact hours, self-study hours)	Total workload: 8 ECTS
Credits	8 ECTS
Necessary and recommended prerequisites for joining the module	Successful completion of all theoretical and practical modules Completion of practice-oriented and R&D modules Fulfillment of all academic requirements of the educational program
Module objectives / expected learning outcomes	The aim of the module is to assess the achievement of program learning outcomes and students' readiness for professional engineering activities. Upon completion of the module, students demonstrate the ability to independently analyze engineering problems in materials science, apply theoretical knowledge and experimental methods, process and interpret technical data, justify engineering decisions, and present results in written and oral form. The module confirms students' professional competencies and preparedness for employment or further study.
Description	The final attestation module includes preparation and defense of the final qualification work (Bachelor thesis/project) and/or final comprehensive examination in accordance with university regulations. Students perform independent analytical, experimental, or design-oriented work under academic supervision. The final project integrates knowledge and skills acquired throughout the program and demonstrates the student's ability to solve engineering problems in materials science and related fields.
Exams and assessment formats	Assessment is conducted in the form of:

	<p>Defense of the final qualification work before an examination committee, and/or Final comprehensive examination (according to university regulations).  Evaluation is based on the quality of the written work, analytical depth, practical relevance, and oral defense performance.</p>
Requirements for studies and exams	<p>Admission to final attestation is granted to students who have successfully completed all required coursework, practices, and credit requirements of the educational program. The final grade is determined by the examination committee in accordance with established academic standards.</p>
Reading list	<ol style="list-style-type: none"> <li>1. ASM International. ASM Handbook (selected volumes).</li> <li>2. Dieter, G. Engineering Design: A Materials and Processing Approach. McGraw-Hill.</li> <li>3. University internship guidelines and safety regulations.</li> </ol>