

**NATIONAL UNIVERSITY  
OF SCIENCE AND TECHNOLOGY "MISIS"**

**МИСиС**



# **Materials for energy efficient technologies**



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# MIS&S TODAY

✓ **The University trains specialists in advanced Materials Science, Nanotechnology and Metallurgy with expertise in**

- Information Technologies
- Energy-effective Technologies
- Operations and Systems Management
- Industrial and Operational Quality Control

# MODEL OF TECHNOLOGICAL EDUCATION

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Professional Specializations (Spetsialitet)

Bachelor's Degrees

Master's Degrees

Changing Directions:  
*Flexible, Intensive, Applied*

Period  
of Applied Activity

Applied  
Bachelor's Degree

Academic  
Bachelor's Degree

Period  
of Applied Activity

Technological  
Master's Degree

Programs of Technological Retraining and Development

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# INTERNATIONAL STANDARDS IN LEARNING AND RESEARCH



**EXCELLENT  
STUDENTS**

- ✓Effective Recruitment System
- ✓Diverse Pool
- ✓Rigorous Selection Excellence

**BEST  
STAFF**

- ✓Industry Professionals
- ✓Leading Russian and International Specialists

**GOOD  
INFRASTRUCTURE**

- ✓Contemporary Infrastructure
- ✓Instructional Equipment

**PROGRESSIVE  
ADMINISTRATION**

- ✓Professionalism
- ✓Openness and Transparency



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# COLLEGES

- ✓ College of Undergraduate Studies
- ✓ College of Ecotechnology and Engineering
- ✓ College of New Materials and Nanotechnology
- ✓ College of Economics and Industrial Management
- ✓ College of Information Technology and Automated Control Systems
- ✓ College of Information Business Processes



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# **Structure of training undergraduate in university**

# The structure of the educational process in bachelor degree

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Training in basic sciences

Training in special subjects

# The structure of the educational process in bachelor degree

**Professional courses (3-d и 4-th year)**

**Teaching of basic courses (1 st и 2 nd year)**

**Unified  
basic  
engineering  
education**

**Information technology;  
management technology; design  
technology; material science**

**Unified  
basic  
education**

**Physics, Chemistry, Mathematics,  
Computer Science, English, social  
projects**



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ПРОГРАММА РАЗВИТИЯ МАТЕРИАЛОВЕДИЕНИЯ  
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The program is aimed to prepare bachelors in areas of research, development, modernization and application of materials to create an energy efficient technologies in various areas of the industry



# Materials for energy efficient technologies

## Program consumers:

- ✓ **mechanical engineering and instrumentation**
- ✓ **aerospace and aviation engineering**
- ✓ **nuclear power engineering**
- ✓ **solid-state electronics**
- ✓ **nanotechnology**
- ✓ **medical technology and equipment**
- ✓ **sports and household appliances**

# Materials for energy efficient technologies

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ПРОГРАММА РАЗВИТИЯ НИТУ «МИСиС»

## PROGRAM OBJECTIVES

# The program will produce graduates who:

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- ✓ are successful in a top graduate school and/or in materials science & engineering positions.
- ✓ participate in implementation of interdisciplinary projects (including international) in the areas of materials science and creation of constructional and functional materials for application in energy efficient technologies;
- ✓ are ready to work in areas of the novel materials science and high-tech fields of energy- and resource-saving technologies;
- ✓ participate effectively in the development of materials with specified technological and functional properties;
- ✓ master the basics of design, process control, development of technical documentation, production management, and aspects of technical and ecological safety, energy- and resource-saving technologies.

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## LEARNING OUTCOMES

- 1. Work with a broad variety of information sources, and to filter and narrow an array of knowledge to meet specific needs;**
- 2. Think critically and creatively, to give and receive an idea in various settings of communication;**
- 3. Communicate effectively in English at a competency level appropriate for multi-national teams working on complex engineering projects;**
- 4. Understand of the importance of information in the development of a modern society and ability to use information and communication technologies in professional activities;**
- 5. Work effectively as an individual and as a member of a team; to understand the skills required to manage interdisciplinary project team dynamics;**
- 6. Apply a basic knowledge of mathematics, natural and social sciences to understand the intellectual foundation and development of the discipline, research novel materials with specific performance characteristics for the energy industry and energy-efficient technologies;**
- 7. Apply basic knowledge of economics to improve the energy-efficiency and resource-saving technologies in industry;**

8. **Apply methods and approaches of energy- and resource-saving technologies to ensure environmental sustainability and ecological safety during implementation of production processes;**
9. **Know the main protection methods of the staff and population from possible consequences of failures, accidents and natural disasters;**
10. **Apply modern scientific equipment and techniques to study functional and structural materials and processes of their production, to design and carry out experiments and evaluate the results obtained;**
11. **Solve engineering challenges in the field of the materials production that meet specific needs for application in energy saving systems;**
12. **Design energy-saving systems, components and process, to develop specifications and technical documentation;**
13. **Understand of the impact of engineering solutions on society and on the environment, including an understanding of health, safety, legal aspects and responsibilities involved in engineering activities, demonstration of personal responsibility and an understanding of the code of ethics and standards of engineering practice;**
14. **Understand of the need for, and the ability to engage in, independent and professional lifelong learning.**



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# Modules

- ✓ **The practice of English language**
- ✓ **Computer Science**
- ✓ **Financial and Industrial Management**
- ✓ **Basic engineering disciplines**
- ✓ **Professional disciplines**
- ✓ **Scientific research / Practical work / Bachelor's thesis**





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# **THE PRACTICE OF ENGLISH LANGUAGE**



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# THROUGH-UNIT MODULES OF LANGUAGE EDUCATION



**Target levels of  
standard**

**CEFR levels**

**Through-unit modules  
of language education**

Advanced	C1	C1++ C1+ C1
Basic	B2	B2++ B2+ B2
	B1	B1+ B1
	A2	A2
	A1	A1

<b>Disciplines</b>	<b>Term</b>	<b>Weeks</b>	<b>Classroom Hours</b>	<b>ECTS</b>
<b>Foreign language</b>	<b>1</b>	<b>17</b>	<b>102</b>	<b>5</b>
<b>Foreign language</b>	<b>2</b>	<b>17</b>	<b>102</b>	<b>5</b>
<b>Foreign language</b>	<b>3</b>	<b>17</b>	<b>102</b>	<b>5</b>
<b>Foreign language</b>	<b>4</b>	<b>17</b>	<b>102</b>	<b>5</b>
<b>Foreign language</b>	<b>5</b>	<b>17</b>	<b>102</b>	<b>5</b>
<b>Foreign language</b>	<b>6</b>	<b>17</b>	<b>102</b>	<b>5</b>
<b>Foreign language for engineers</b>	<b>7</b>	<b>17</b>	<b>102</b>	<b>5</b>
<b>Foreign language for engineers</b>	<b>8</b>	<b>14</b>	<b>52</b>	<b>2</b>
<b>TOTAL + IELTS test</b>		<b>133</b>	<b>817</b>	<b>37</b>



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# Financial and Industrial Management Module

<b>Disciplines</b>	<b>Term</b>	<b>Weeks</b>	<b>Classroom Hours</b>	<b>ECTS</b>
<b>Economics</b>	<b>3</b>	<b>17</b>	<b>85</b>	<b>5</b>
<b>Corporate financial accounting</b>	<b>6</b>	<b>17</b>	<b>68</b>	<b>3</b>
<b>Fundamentals of industrial management</b>	<b>7</b>	<b>17</b>	<b>68</b>	<b>3</b>
<b>Business administration. ERP/MES systems</b>	<b>7</b>	<b>17</b>	<b>34</b>	<b>2</b>
<b>TOTAL</b>		<b>68</b>	<b>255</b>	<b>13</b>



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# Computer Science Module

<b>Disciplines</b>	<b>Term</b>	<b>Weeks</b>	<b>Classroom Hours</b>	<b>ECTS</b>
<b>Information technology and algorithmic foundations</b>	<b>1</b>	<b>17</b>	<b>68</b>	<b>4</b>
<b>Object-oriented programming</b>	<b>2</b>	<b>17</b>	<b>51</b>	<b>3</b>
<b>Data processing methods and numerical methods</b>	<b>3,4</b>	<b>17</b>	<b>61</b>	<b>4</b>
<b>TOTAL</b>		<b>68</b>	<b>180</b>	<b>11</b>



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# Basic engineering disciplines

Disciplines	Term	Weeks	Classroom Hours	ECTS
mathematics, physics, chemistry, electrical engineering science, environment, engineering drawing, life safety in enterprises, crystallography, metrology and technical measurement	<b>1-7</b>		<b>1664</b>	<b>96</b>



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# Professional disciplines

Disciplines	Term	Classroom Hours	ECTS
Physical properties of solids, The theory of homogeneous and heterogeneous processes, Phase and structural transformations in materials, Power generation and conservation materials, Microelectronics and Nanoelectronics, Technology of semiconductor devices and integrated circuits, High-tech methods of transportation and use of traditional energy sources etc.	<b>5-8</b>	<b>520</b>	<b>35</b>

# Scientific research / Practical work / Bachelor's thesis

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<b>Disciplines</b>	<b>Term</b>	<b>Weeks</b>	<b>ECTS</b>
<b>Scientific research</b>	<b>7</b>	<b>2</b>	<b>3</b>
<b>Practical work</b>	<b>2/6</b>	<b>2/4</b>	<b>9</b>
<b>Bachelor's thesis</b>	<b>8</b>	<b>6</b>	<b>9</b>
<b>TOTAL</b>		<b>14</b>	<b>21</b>





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**Thank you for attention!**