KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY named after K.I.SATPAYEV

SATBAYEV UNIVERSITY

APPROVED
Chairman of the Management Board -
Rector of KazNRTU named after K.S...
M.M. Be...

**CURRICULUM**
**of Educational Program on enrollment for 2024-2025 academic year**

**Educational program 7M07103 - "Materials science and technology of new materials"**
**Group of educational programs M101 - "Materials science and technology of new materials"**

Form of study: full-time | Duration of study: 2 year | Academic degree: master of technical sciences

| Discipline code | Name of disciplines | Cycle | Total amount in credits | Total hours | Classroom amount lec/lab/pr | SIS (including TSIS) in hours | Form of control | Allocation of face-to-face training based on courses and semesters | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | I course | | 2 course | |
| | | | | | | | | 1 semester | 2 semester | 3semester | 4 semester |
| **M-1. Module of basic training (university component)** | | | | | | | | | | | |
| LNG213 | English (professional) | BD UC | 3 | 150 | 0/0/3 | 105 | E | 3 | | | |
| HUM214 | Management Psychology | BD UC | 3 | 90 | 1/0/1 | 60 | E | 3 | | | |
| HUM212 | History and philosophy of science | BD UC | 3 | 90 | 1/0/1 | 60 | E | | 3 | | |
| HUM213 | Higher school pedagogy | BD UC | 3 | 90 | 1/0/1 | 60 | E | | 3 | | |
| **M - 2. Module of applied problems of materials science** | | | | | | | | | | | |
| PHY712 | Technological quality assurance of materials | BD, CCH | 5 | 150 | 2/0/1 | 105 | E | | 5 | | |
| MNG781 | Intellectual property and research | | | | 2/0/1 | | | | | | |
| PHY278 | Modern problems of materials and process sciences | | | | 1/0/2 | | | | | | |
| PHY711 | Materials science and technologies of advanced materials | BD, CCH | 5 | 150 | 2/0/1 | 105 | E | | 5 | | |
| PHY280 | The scientific basis and practice of application of nano | | | | 1/0/2 | | | | | | |
| PHY725 | Materials research methods | BD, CCH | 5 | 150 | 2/0/1 | 105 | E | 5 | | | |
| MNG782 | Sustainable development strategies | | | | 2/0/1 | | | | | | |
| PHY724 | Structure and properties of carbon nanomaterials | | | | 2/0/1 | | | | | | |
| PHY719 | Multiphase structures and methods for calculating phase diagrams | PD, UC | 5 | 150 | 2/0/1 | 105 | E | | | 5 | |
| PHY720 | Destruction and reliability assessment of materials | PD, CCH | 5 | 150 | 2/0/1 | 105 | E | | | 5 | |
| PHY274 | Methods for calculating phase transformations and structural analysis of materials | | | | 2/1/0, | | | | | | |
| **M-3. Advanced Materials Science Module** | | | | | | | | | | | |
| PHY723 | Composite materials with desired properties | PD, UC | 5 | 150 | 2/0/1 | 105 | E | | 5 | | |
| PHY714 | New functional materials | PD, UC | 5 | 150 | 2/0/1 | 105 | E | | 5 | | |
| PHY716 | Materials for 3D technology | PD, UC | 5 | 150 | 2/0/1 | 105 | E | 5 | | | |
| **M-4. Nanotechnology module** | | | | | | | | | | | |
| PHY717 | Functional problems of materials science | PD, CCH | 5 | 150 | 2/0/1 | 105 | E | 5 | | | |
| PHY260 | Methods for obtaining functional materials and nanostructures | | | | 1/0/2 | | | | | | |
| PHY722 | Advanced materials processing technologies | PD, CCH | 5 | 150 | 2/0/1 | 105 | E | | | 5 | |
| PHY261 | The study of functional materials by electron and probe microscopy | | | | 1/0/2 | | | | | | |
| PHY721 | The surface structure engineering | PD, CCH | 5 | 150 | 2/0/1 | 105 | E | | | 5 | |
| PHY726 | Nanomaterials and nanotechnologies in industry | | | | 2/0/1 | | | | | | |
| **M-5. R&D module** | | | | | | | | | | | |
| PHY718 | Methodology for materials selection and technology | BD, CCH | 5 | 150 | 2/0/1 | 105 | E | | | 5 | |
| PHY276 | Innovation in material science | | | | 2/0/1 | | | | | | |

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| **M-6. Practice-oriented module** | | | | | | | | | | | |
| AAP273 | Pedagogical practice | BD UC | 8 | | | | | | 8 | | |
| AAP269 | Research practice | PD, UC | 8 | | | | | | | | |
| **M-7. Experimental research module** | | | | | | | | | | | |
| AAP251 | Research work of a master's student, including internship and completion of a master's thesis | RWMS UC | 2 | | | | | 2 | | | |
| AAP241 | Research work of a master's student, including internship and completion of a master's thesis | RWMS UC | 3 | | | | | | 3 | | |
| AAP254 | Research work of a master's student, including internship and completion of a master's thesis | RWMS UC | 5 | | | | | | | 5 | |
| AAP255 | Research work of a master's student, including internship and completion of a master's thesis | RWMS UC | 14 | | | | | | | | |
| **M-8. Module of final attestation** | | | | | | | | | | | |
| ECA212 | Preparation and defense of a master's thesis | FA | 8 | | | | | | | | |
| **Total based on UNIVERSITY:** | | | | | | | | 23 | 37 | 30 | 30 |
| | | | | | | | | 60 | | 60 | |

**Federal State Autonomous Educational Institution of Higher Education**
**National Research Tomsk Polytechnic University**

**Educational program "Production of products from nanostructured materials and additive technologies"**
**Course of study 22.04.01 - "Materials science and technology of materials"**

| Discipline code | Name of disciplines | Cycle | Total amount in credits | Total hours | Classroom amount lec/lab/pr | SIS (including TSIS) in | Form of control | Allocation of face-to-face training based on | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 1 course | | 2 course | |
| | | | | | | | | 1 semester | 2 semester | 3semester | 4 semester |
| **M1 Block 1. Disciplines (modules)** | | | | | | | | | | | |
| **M1.БМ1 Модуль общенаучных дисциплин** | | | | | | | | | | | |
| PHY728 | Philosophical and methodological problems of science and technology | BD UC | 3 | 108 | 1/0/1 | 76 | Exam | | 3 | | |
| PHY729 | Professional training in English | BD UC | 6 | 216 | 0/0/4 | 152 | Test | 3 | 3 | | |
| **M1.BM2 Module of general professional disciplines** | | | | | | | | | | | |
| PHY730 | Materials science and technologies of modern and promising materials | BD UC | 6 | 216 | 1/1/1 | 152 | Exam | | 6 | | |
| PHY731 | High technologies: from research to business | PD, UC | 3 | 108 | 1/1/1 | 60 | Exam | | 3 | | |
| PHY732 | Powder consolidation processes: regularities and efficiency criteria | PD, UC | 3 | 108 | 1/1/1 | 60 | Test | 3 | | | |
| PHY733 | Technologies of zero-dimensional nanoobjects | BD UC | 3 | 108 | 1/1/1 | 60 | Test | 3 | | | |
| PHY734 | Dimensional effects in nanomaterials | PD, UC | 3 | 108 | 1/1/1 | 76 | Test | | 3 | | |
| **M1.BM1 Interdisciplinary professional module (part formed by participants of educational relations)** | | | | | | | | | | | |
| PHY735 | Modern methods of structural analysis in materials science* | BD UC | 6 | 216 | 1/1/1 | 136 | Exam | 6 | | | |
| PHY736 | The main directions of development of materials science | PD, UC | 3 | 108 | 1/1/1 | 60 | Test | 3 | | | |
| PHY737 | Technologies for manufacturing products from bulk nanomaterials | PD, UC | 3 | 108 | 1/1/1 | 136 | Exam | | 3 | | |
| **M1.BM2 Module of university-wide elective disciplines** | | | | | | | | | | | |
| PHY739 | Psychology of communication | BD UC | 2 | 72 | 1/0/1 | 40 | Test | 2 | | | |
| **M1.BM3 Variable interdisciplinary professional module** | | | | | | | | | | | |
| **M1.BM3.1 "Production of products from nanostructured materials and additive technologies"** | | | | | | | | | | | |
| PHY741 | Probe methods of diagnostics of the structure and properties of nanomaterials | PD, UC | 6 | 216 | 1/1/1 | 152 | Exam | | | 6 | |
| PHY742 | Modeling of nanomaterials | PD, UC | 6 | 216 | 1/1/1 | 152 | Exam | | | 6 | |
| PHY743 | Methods of testing the performance characteristics of nanomaterials | PD, CCH | 6 | 216 | 1/1/1 | 152 | Exam | | | 6 | |
| PHY744 | Modern technologies of surface hardening | | | | | | | | | | |
| PHY745 | Nanomaterials and the environment | PD, CCH | 6 | 216 | 1/1/1 | 152 | Exam | | | 6 | |
| PHY746 | Technologies for the production of powder composite materials | | | | | | | | | | |

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| **M2 Block 2. Dispersed practices, including research.** | | | | | | | | | | | |
| **M2.B Variable part.** | | | | | | | | | | | |
| PHY747 | Fundamentals of pedagogical activity | BD UC | 1 | 36 | | | | 1 | | | |
| PHY748 | Pedagogical practice | BD UC | 3 | 108 | | | | | 3 | | |
| PHY749 | Research work in the semester | PD, UC | 18 | 648 | | | | 6 | 6 | 6 | |
| **M2 Block 2. Practices** | | | | | | | | | | | |
| PHY750 | Research work (obtaining primary skills of research work) | PD, UC | 6 | 216 | | | | | | 6 | |
| PHY751 | Research work | PD, UC | 9 | 324 | | | | | | | 9 |
| PHY752 | Undergraduate Practice | PD, UC | 15 | 540 | | | | | | | 15 |
| **M3 Block 3. State final certification** | | | | | | | | | | | |
| PHY753 | Master's final qualifying work (performance, preparation for the defense procedure and defense of the final qualifying work) | FA | 9 | 324 | | | | | | | 9 |
| | | | | | | | | 25 | 29 | 33 | 33 |

| Number of credits for the entire period of study | | | | | |
|---|---|---|---|---|---|
| Cycle code | Cycles of disciplines | Credits | | | |
| | | | university component (UC) | component of choice (CCH) | Total |
| BD | Cycle of basic disciplines | | 20 | 15 | 35 |
| PD | Cycle of profile disciplines | | 28 | 25 | 53 |
| | *Total for theoretical training:* | *0* | *48* | *40* | *88* |
| | RWMS | | | | *24* |
| FA | Final attestation | 12 | | | 8 |
| | **TOTAL:** | **12** | **48** | **40** | **120** |

**Decision of the Academic Council of Kazntu named after K.Satpayev. Protocol №** 12 "22" 04 2024 y.

**Decision of the Educational and Methodological Council of Kazntu named after K.Satpayev. Protocol №** 6 "19" 04 2024 y.

**Decision of the Academic Council of the Institute M&M. Protocol №** 7 "29" 03 2024 y.

**Vice-Rector for Academic Affairs** — Uskenbayeva R.K.

**Director of M&M Institute** — Rysbekov K.B.

**Head of the MN&EP Department** — Kudaibergenov K.K.

**Specialty Council representative from employers** — Idrisova T.K.