MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

# CURRICULUM

(Enrolment 2021)

**APPROVED**
by Head of Academic Council
Igor Sikorsky Kyiv Polytechnic Institute

Mykhaylo ILCHENKO
"__"_____ 2021

**Level** Bachelor

**Form of study** full-time (full-time, part-time)

**Speciality** 132 Materials Science

**Faculty (Institute)** IMZ

**Specialization** Nanotechnologies and Computer-aided Materials Design

**Qualification** Bachelor of Materials Science

**Graduation Department** High-temperature Materials and Powder Metallurgy

**Study duration** 3 years 10 months

**Base level** Complete general secondary education

## I. Schedule of educational process

| YEAR | September | | | | October | | | | | November | | | | | December | | | | January | | | | | February | | | | | March | | | | April | | | | | May | | | | June | | | | July | | | | | August | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 |
| I | | | | | | | 18 | | | | | | | | | | | | E | E | H | H | | | | | | | 18 | | | | | | | | | | | | E | E | H | H | H | H | H | H | H | H | H | H |
| II | | | | | | | 18 | | | | | | | | | | | | E | E | H | H | | | | | | | 18 | | | | | | | | | | | | E | E | H | H | H | H | H | H | H | H | H | H |
| III | | | | | | | 18 | | | | | | | | | | | | E | E | H | H | | | | | | | 18 | | | | | | | | | | | | E | E | H | H | H | H | H | H | H | H | H | H |
| IV | | | | | | | 18 | | | | | | | | | | | | E | E | H | H | | | | | | | 9 | | | E | P | P | P | P | P | R | R | R | R | A | A | | | | | | | | | | |

**Symbols:** Learning period; E Examination; P Practice; R Research; A Assessment; H Holiday

## II. Summary table of time budget (Weeks)

| YEAR | Learning period | Examination | Practice | Assessment | Research | Holiday | Total |
|---|---|---|---|---|---|---|---|
| I | 36 | 4 | | | | 12 | 52 |
| II | 36 | 4 | | | | 12 | 52 |
| III | 36 | 4 | | | | 12 | 52 |
| IV | 27 | 3 | 5 | 4 | 2 | 2 | 43 |

## III. Practice

| Type of practice | YEAR | Weeks |
|---|---|---|
| Pre-diploma Practice | 8 | 5 |
| | | |

## IV. Graduates assessment

| Subjects | Form of graduates assessment (exam, graduation project) | YEAR |
|---|---|---|
| | Graduation project | 8 |
| | | |

## V. Plan of Educational process

| Code | Subjects | Distribution for terms (semesters) | | | | ECTS Credits | Number of hours | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Exams | Final tests | Course projects | Coursework | | Total | Lectures/practical lessons | | | Self-study |
| | | | | | | | | Lectures | Practical | Laboratory | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| **1. Compulsory educational components** | | | | | | | | | | | |
| **1.1. General training cycle** | | | | | | | | | | | |
| GO I | Ukrainian language for Specific Purposes | | 2 | | | 2 | 60 | 18 | 18 | | 24 |
| GO II | History of science and technology | | 1 | | | 2 | 60 | 18 | 18 | | 24 |
| GO III | Basics of a healthy lifestyle | | 2 | | | 3 | 90 | 18 | 54 | | 18 |
| GO IV | Foreign Language | | 2.4 | | | 6 | 180 | | 144 | | 36 |
| GO V | Foreign Language for Specific Purposes | 8 | 6 | | | 6 | 180 | | 126 | | 54 |
| GO VI | Philosophical Principles of Scientific Cognition | | 3 | | | 2 | 60 | 18 | 18 | | 24 |
| GO VII | Environmental safety of engineering activities | | 4 | | | 2 | 60 | 18 | 18 | | 24 |
| GO VIII | Protection of intellectual property rights | | 5 | | | 2 | 60 | 18 | 18 | | 24 |
| GO IX | Higher mathematics:<br>1. Differential Calculus and Linear Algebra<br>2. Integral Calculus and Differential Equations<br>3. Theory of Probability and Mathematical Statistics | 1,2,3 | | | | 19 | 570 | 162 | 172 | | 236 |
| GO X | Informatics, Computer Science, Programming and Numerical Methods:<br>1. Informatics, Computer Science and Programming<br>2. Numerical Methods | 1 | 2 | | | 9.5 | 285 | 54 | | 108 | 123 |
| | **total number of part 1.1** | 5 | 10 | | | 53.5 | 1605 | 324 | 586 | 108 | 587 |
| **1.2.Vocational training cycle** | | | | | | | | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VO I | Chemistry:<br>1. General chemistry<br>2. Chemistry of Elements | **1.2** | | | | **10.5** | **315** | **72** | **18** | **72** | **153** |
| VO II | Engineering and Computer Graphics<br>1. Descriptive Geometry, Engineering Graphics<br>2. Computer Graphics | | **1.2** | | | **5.5** | **165** | **18** | **90** | | **57** |
| VO III | Coursework of Engineering and Computer Graphics | | **2** | | **2** | **1** | **30** | | | | **30** |
| VO IV | Physics:<br>1. Mechanics, Molecular Physics and Thermodynamics, Electricity and Magnetism<br>2. Optics, Atomic and Nuclear Physics | **2.3** | | | | **13.5** | **405** | **126** | **54** | **46** | **179** |
| VO V | Physical Chemistry | **3** | | | | **4.5** | **135** | **36** | | **36** | **63** |
| VO VI | Fundamentals of Electric Engineering and Electronics | | **3** | | | **3** | **90** | **36** | **10** | **8** | **36** |
| VO VII | Theoretical and Applied Mechanics | | **3, 4** | | | **4** | **120** | **36** | **28** | **8** | **48** |
| VO VIII | Crystallography, Crystal Chemistry and Mineralogy | | **3** | | | **4** | **120** | **36** | | **28** | **56** |
| VO IX | Economics and Organization of Production | | **7** | | | **4** | **120** | **36** | **36** | | **48** |
| VO X | Labour Safety and Civil Defence | | **7** | | | **4** | **120** | **36** | **28** | **8** | **48** |
| VO XI | Introduction to Materials Science | | **1** | | | **2** | **60** | **36** | | | **24** |
| VO XII | Methods of Research of Physical Properties of Materials | **4** | | | | **5** | **150** | **36** | | **36** | **78** |
| VO XIII | Fundamentals of Metal Science | **4** | | | | **5** | **150** | **36** | | **36** | **78** |
| VO XIV | Crystal Chemistry of Refractory Compounds | | **4** | | | **3.5** | **105** | **28** | | **18** | **59** |
| VO XV | Theory of Heat and Mass Transfer in Materials | | **4** | | | **3** | **90** | **36** | **18** | | **36** |
| VO XVI | Condensed Matter and Materials Physics | **4** | | | | **6** | **180** | **54** | **28** | | **98** |
| VO XVII | Methods of Structural Analysis | | **5** | | | **3** | **90** | **36** | | **18** | **36** |
| VO XVIII | Physico-chemical bases of obtaining metals, alloys and compounds in powder and nanodisperse state | **5** | | | | **5** | **150** | **36** | | **28** | **86** |
| VO XIX | Materials Science of Refractory Materials | **5** | | | | **4** | **120** | **28** | | **18** | **74** |
| VO XX | Standardization, Metrology and Products Quality Control | | **5** | | | **2.5** | **75** | **18** | **18** | | **39** |
| VO XXI | Mechanical Properties of Materials | **6** | | | | **5** | **150** | **44** | | **28** | **78** |
| VO XXII | Fundamentals of theory of processes of powder and nanostructured materials consolidation | **6** | | | | **4.5** | **135** | **36** | | **18** | **81** |
| VO XXIII | Methods of Modelling and Optimiztion | | **6** | | | **3** | **90** | **36** | | **18** | **36** |
| VO XXIV | Corrosion and Metal Protection | **7** | | | | **4** | **120** | **36** | | **18** | **66** |
| VO XXV | Course project (interdisciplinary) Design of production of powder, composite and nanostructured materials and products | | **7** | **7** | | **1.5** | **45** | | | | **45** |
| VO XXVI | Foundations of Computer Design of Materials | | **8** | | | **2** | **60** | **18** | **18** | | **24** |
| VO XXVII | Fundamentals of Experimentation | | **8** | | | **1.5** | **45** | **18** | **10** | | **17** |
| VO XXVIII | Pre-diploma Practice | | **8** | | | **6** | **180** | | | | **180** |
| VO XXIX | Diploma Project | | | | | **6** | **180** | | | | **180** |
| | **total number of part 1.2** | **13** | **19** | **1** | **1** | **126.5** | **3795** | **964** | **356** | **442** | **2033** |
| | **TOTAL IN NORMATIVE educational components** | **18** | **29** | **1** | **1** | **180** | **5400** | **1288** | **942** | **550** | **2620** |
| | **2. Optional educational components** | | | | | | | | | | |
| | **2.1. General training cycle (Optional subjects from University catalogue)** | | | | | | | | | | |
| GV I | Educational Component 1 GU - Catalog | | 3 | | | 2 | 60 | 18 | 18 | | 24 |
| GV II | Educational Component 2 GU - Catalog | | 4 | | | 2 | 60 | 18 | 18 | | 24 |
| | **total numberof part II.1** | | **2** | | | **4** | **120** | **36** | **36** | | **48** |
| | **2.2. Vocational training cycle (Optional subjects from Faculty catalogue)** | | | | | | | | | | |
| PV I | Educational Component 1 F - Catalog | | 5 | | | 4 | 120 | 36 | 18 | | 66 |
| PV II | Educational Component 2 F - Catalog | | 5 | | | 4 | 120 | 44 | | 18 | 58 |
| PV III | Educational Component 3 F - Catalog | | 5 | | | 4 | 120 | 36 | | 18 | 66 |
| PV IV | Educational Component 4 F - Catalog | | 6 | | | 4 | 120 | 36 | | 28 | 56 |
| PV V | Educational Component 5 F - Catalog | | 6 | | | 4 | 120 | 36 | | 28 | 56 |
| PV VI | Educational Component 6 F - Catalog | | 6 | | | 4 | 120 | 36 | 28 | | 56 |
| PV VII | Educational Component 7 F - Catalog | | 6 | | | 4 | 120 | 36 | | 18 | 66 |
| PV VIII | Educational Component 8 F - Catalog | | 7 | | | 4 | 120 | 36 | 18 | | 66 |
| PV IX | Educational Component 9 F - Catalog | | 7 | | | 4 | 120 | 36 | | 18 | 66 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PV X | Educational Component 10 F - Catalog | | 7 | | | 4 | 120 | 36 | | 18 | 66 |
| PV XI | Educational Component 11 F - Catalog | | 7 | | | 4 | 120 | 36 | 18 | | 66 |
| PV XII | Educational Component 12 F - Catalog | | 8 | | | 4 | 120 | 28 | 18 | | 74 |
| PV XIII | Educational Component 13 F - Catalog | | 8 | | | 4 | 120 | 28 | | 18 | 74 |
| PV XIV | Educational Component 13 F - Catalog | | 8 | | | 4 | 120 | 28 | 18 | | 74 |
| **total number of part II.2** | | | **14** | | | **56** | **1680** | **488** | **118** | **164** | **910** |
| **TOTAL IN SELECTME educational components** | | **0** | **16** | **0** | **0** | **60** | **1800** | **524** | **154** | **164** | **958** |
| **TOTAL** | | **18** | **45** | **1** | **1** | **240** | **7200** | **1812** | **1096** | **714** | **3578** |

**Approved by University Academic Council, Meeting protocol № 3 from 15.03.2021**

**Head of the Department _____/ Yuriy BOGOMOL /**

**Director of the Institute _____ / Yuriy SIDORENKO /**