*"APPROVE"*

Rector

_____ Hrabko V.V.

"27" 12. 2018 y.

**Ministry of Education and Science of Ukraine**
**VINNYTSIA NATIONAL TECHNICAL UNIVERSITY**

# UNIVERSITY CURRICULUM

**Program for Master's Training**

**Field of Study** 16 Chemical and bioengineering

**Courses Duration** 1 years and 4 months

Minutes №6 of 27.12.2018
of the Academic Board of VNTU

**Program Subject Area** 163 Biomedical Engineering

**Educational Program** Intelligent artificial implants and medical devices in bioengineering

**Type of Attendance** Full-Time

## I. Academic calendar

| Course | 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 | | | | | | | | | | | | | | | | | | | C | C | V | V | | | | | | | | | | | | | | | | | | | S | S | V | V | V | V | V | V | V | V | V | V |
| II | P | P | P | P | P | S/C | M | M | M | M | M | M | M | M | M | M | S/C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

**Marking:**

☐ - Theoretical Training  S - Examination Session  P - Practice  M - Master's qualification work  S/C - State Certification  V - Vacation

## II. Aggregated Data of Time Budget, Weeks

| Course | Theoretical Training | Examination Session | Practice | State Certification | Implementation MQW | Vacation | Total |
|---|---|---|---|---|---|---|---|
| I | 36 | 4 | | | | 12 | 52 |
| II | | | 5 | 2 | 10 | | 17 |
| Total | 36 | 4 | 5 | 2 | 10 | 12 | 69 |

## III. Practical Training

| Type of Practice | Semester | Weeks | ECTS Credits |
|---|---|---|---|
| | | | |
| Pre-Graduation Practice | 3 | 5 | 9 |

## IV. State Certification

| Name of Academic Subjects | Form of State Certification | Semester | ECTS Credits |
|---|---|---|---|
| specialty | exam | 3 | 1 |
| | Master's qualification work | 3 | 20 |

## V. План навчального процесу

| № | Name of the Subject | Distribution by semesters | | | | Number of ECTS Credits | Number of Hours | | | | | | Distribution by semesters | | | | Chair |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Course | | | | In-Class Hours | | | | Student's Individual Work | 1 semester | | 2 semester | | |
| | | | | | | | | | Including | | | | 18 weeks | | 18 weeks | | |
| | | Examinations | Credits | projects | works | | Total Number | Total | Lectures | Laboratory | Practical | | ECTS credits | In-Class Hours | ECTS credits | In-Class Hours | |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** |
| **1. Compulsory Subjects** | | | | | | | | | | | | | | | | | |
| **1.1. General training disciplines** | | | | | | | | | | | | | | | | | |
| 1.1.1. | Philosophy of science and technology | | 2 | | | 3,0 | 90 | 36 | 18 | | 18 | 54 | | | 3 | 36 | |
| 1.1.2. | Pedagogy, Psychology and Teaching Methods in Higher Education | | 2 | | | 3,0 | 90 | 36 | 18 | | 18 | 54 | | | 3 | 36 | |
| 1.1.3. | Business Foreign Language | | 2 | | | 3,0 | 90 | 36 | | | 36 | 54 | 1,5 | 18 | 1,5 | 18 | |
| | | | | | **Total** | **9,0** | **270,0** | **108,0** | **36,0** | **0,0** | **72,0** | **162,0** | **1,5** | **18** | **7,5** | **90** | |
| **1.2 Subjects of Professional and Practical Training** | | | | | | | | | | | | | | | | | |
| 1.2.1. | Modern information technology in the industry of chemical and bioengineering | 1 | | | | 4,0 | 120 | 45 | 27 | 18 | | 75 | 4,0 | 45 | | | BMI |
| 1.2.2. | Economic justification of innovative solutions in the field of chemical and bioengineering | | 1 | | | 4,0 | 120 | 45 | 27 | | 18 | 75 | 4,0 | 45 | | | |
| 1.2.3. | Methodology and organization of scientific research | 2 | | | | 4,0 | 120 | 45 | 27 | | 18 | 75 | | | 4,0 | 45 | BMI |
| 1.2.4. | Civil protection and health protection in the field of chemical and bioengineering | | 2 | | | 3,0 | 90 | 36 | 12 | | 24 | 54 | 1,5 | 18 | 1,5 | 18 | |
| 1.2.5. | Processing of biomedical images and reconstruction of objects | 1 | | | 1 | 5,0 | 150 | 54 | 27 | 18 | 9 | 96 | 5,0 | 54 | | | BMI |
| | | | | | **Total** | **20,0** | **600,0** | **225,0** | **120,0** | **36,0** | **69,0** | **375,0** | **14,5** | **162** | **5,5** | **63** | |
| | | | | | **Total by CS** | **29,0** | **870,0** | **333,0** | **156,0** | **36,0** | **141,0** | **537,0** | **16,0** | **180** | **13,0** | **153** | |

| № | Name of the Subject | Distribution by semesters | | | | Number of ECTS Credits | Number of Hours | | | | | | | Distribution by semesters | | | | Chair |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Course | | | | In-Class Hours | | | | Student's Individual Work | | 1 semester | | 2 semester | | |
| | | | | | | | | | Including | | | | | 18 weeks | | 18 weeks | | |
| | | Examinations | Credits | projects | works | | Total Number | Total | Lectures | Laboratory | Practical | | | ECTS credits | In-Class Hours | ECTS credits | In-Class Hours | |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | | **14** | **15** | **16** | **17** | 18 |
| **2. ELECTIVE SUBJECTS** | | | | | | | | | | | | | | | | | | |
| **2.1. Subjects, elected by the University** | | | | | | | | | | | | | | | | | | |
| **2.1.1 Subjects of Professional and Practical Training** | | | | | | | | | | | | | | | | | | |
| 2.1.2.1. | Computer technologies in medicine | 2 | | 2 | | 10,0 | 300 | 135 | 72 | 36 | 27 | 165 | | | | 10,0 | 135 | BMI |
| 2.1.2.2. | Medical bioengineering systems | 1 | | 1 | | 6,0 | 180 | 72 | 36 | 27 | 9 | 108 | | 6,0 | 72 | | | BMI |
| 2.1.2.3. | Medical equipment for special purposes | | 1 | | | 4,0 | 120 | 54 | 36 | 18 | | 66 | | 4,0 | 54 | | | BMI |
| | **Всього** | | | | | **20,0** | **600** | **261** | **144** | **81** | **36** | **339** | | **10,0** | **126** | **10,0** | **135** | |
| | **Всього за ВНЗ** | | | | | **20,0** | **600** | **261** | **144** | **81** | **36** | **339** | | **10,0** | **126** | **10,0** | **135** | |
| **2.2 Disciplines of free choice of student** | | | | | | | | | | | | | | | | | | |
| **2.2.1. Subjects of Professional and Practical Training** | | | | | | | | | | | | | | | | | | |
| 2.2.1.1. | **Unit # 1 - Artificial Implants for Bioengineering** | | | | | | | | | | | | | | | | | |
| 2.2.1.1.1 | Hardware and software and medical engineering support of bioengineering and medical devices and systems | 1 | | | | 4,0 | 120 | 54 | 27 | | 27 | 66 | | 4,0 | 54 | | | BMI |
| 2.2.1.1.2 | Regenerative medicine and 3-D printing for biomedical engineering | 2 | | | | 7,0 | 210 | 72 | 36 | 27 | 9 | 138 | | | | 7,0 | 72 | BMI |
| | **Total** | | | | | **11,0** | **330,0** | **126,0** | **63,0** | **27,0** | **36,0** | **204,0** | | **4,0** | **54** | **7,0** | **72** | |
| 2.2.1.2. | **Unit # 2 - Biomedical Engineering** | | | | | | | | | | | | | | | | | |
| 2.2.1.2.1 | Modeling methods in biotechnical and medical devices and systems | 1 | | | | 4,0 | 120 | 54 | 27 | | 27 | 66 | | 4,0 | 54 | | | BMI |
| 2.2.1.2.2 | Problem-oriented programming in biotechnical and medical devices and systems | 2 | | | | 7,0 | 210 | 72 | 36 | 27 | 9 | 138 | | | | 7,0 | 72 | BMI |
| | **Total** | | | | | **11,0** | **330,0** | **126,0** | **63,0** | **27,0** | **36,0** | **204,0** | | **4,0** | **54** | **7,0** | **72** | |
| | **Total by ES** | | | | | **31,0** | **930,0** | **387,0** | **207,0** | **108,0** | **72,0** | **543,0** | | **14,0** | **180** | **17,0** | **207** | |
| | **Theoretical Training, total** | | | | | **60,0** | **1800** | **720** | **363** | **144** | **213** | **1080** | | **30,0** | **360** | **30,0** | **360** | |
| | Number of ECST credits a week | | | | | | | | | | | | | 1,5 | | 1,5 | | |
| | Number of total hours a week | | | | | | | | | | | | | 45 | | 45 | | |
| | Number of the in-class hours a week | | | | | | | | | | | | | | 20 | | 20 | |
| | Practical Training | | | | | 9,0 | 270 | | | | | 270 | | | | | | |
| | Master's qualification work | | | | | 20,0 | 600 | | | | | 600 | | | | | | |
| | State Examinations | | | | | 1,0 | 30 | | | | | 30 | | | | | | |
| | **According to the curriculum** | | | | | **90,0** | **2700** | **720** | **363** | **144** | **213** | **1980** | | | | | | |
| | Number of Course projects | | | | | | 2 | | | | | | | 1 | | 1 | | |
| | Number of Courseworks | | | | | | 1 | | | | | | | 1 | | | | |
| | Number of Examinations | | | | | | 7 | | | | | | | 4 | | 3 | | |
| | Number of Credits | | | | | | 6 | | | | | | | 2 | | 4 | | |

Draft of the Curriculum is proposed by the Department IREN

Curriculum is put into execution from 2019-2020 academic year

First Pro-rector for Research and Academic Work in charge of curriculum organization and scientific methodical support

Head of the Academic Office

Dean of Department IREN

Deputy Dean of EMW

Head of the Department BMI