Approved by University Academic Council Session

Minutes №\_\_\_\_ «\_\_\_\_»\_\_\_\_2019.

**Rector**

**G.Mutanov\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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|  |
| ***Al-Farabi Kazakh National University*** |
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| 8D071 – ENGINEERING |
| **curriculum** **oF educational program** **8D07102 - Chemical engineering****(in English)** |
|  |
|  |
| **Duration of study – 3 years** |
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|  |
|  |
| Degree to award: |
| Doctor of Philosophy (PhD) on specialty «8D07102 - Chemical Engineering » |
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|  |

| **Сode** | **Names оf disciplines/other educational activities** | **Credits** | **Hours** | **including:** | **Semesters** | **Final control form** |
| --- | --- | --- | --- | --- | --- | --- |
| **Lec** | **practice** | **Lab** | **IWSS** | **IWS** | **I** | **II** | **III** | **IV** | **V** | **VI** |
| **Credits** |
| 1. **THEORETICAL TRAINING**
 | **45** | **1350** |  |  |  |  |  |  |  |  |  |  |  |  |
| **1.1 Core Disciplines (CD)** | **20** | **600** |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. **UNIVERSITY COMPONENT**
 | **5** | 150 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **М-1 Scientific research tools** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **AP7201** | Academic writing | **2** |  |  | 18 |  | 3 | 39 |  |  |  |  |  |  |  |
| **MNI7202** | Scientific research methods | **3** |  | 15 | 15 |  | 4 | 56 |  |  |  |  |  |  |  |
| 1. **Elective Component (ЕС)**
 | 5 | 150 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **M-2 Aspects of teaching modern technologies of chemical engineering** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **STHI 7203** | Modern trends in chemical engineering | **5** | 150 | 15 | 30 | 0 | 7 | 98 | 5 |  |  |  |  |  | Exam |
| **NP 7203** | Petrochemical derivatives | 5 | 150 | 15 | 30 | 0 | 7 | 98 | 5 |  |  |  |  |  | Exam |
| **SVES 7203** | Modern high-energy electrochemical systems | 5 | 150 | 15 | 30 | 0 | 7 | 98 | 5 |  |  |  |  |  | Exam |
| **IMTBM 7203** | Innovative methods of transformation of bioorganic molecules | 5 | 150 | 15 | 30 | 0 | 7 | 98 | 5 |  |  |  |  |  | Exam |
| **IPEI 7203** | Innovative environmental engineering projects | 5 | 150 | 15 | 30 | 0 | 7 | 98 | 5 |  |  |  |  |  | Exam |
| **PISGMP 7203** | Production infrastructure of a modern mining and metallurgical enterprise | 5 | 150 | 15 | 30 | 0 | 7 | 98 | 5 |  |  |  |  |  | Exam |
|  | **М-2 Aspects of teaching modern technologies of chemical engineering** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **PP 7204** | 1. **TEACHING INTERSHOP**
 | **10** | 300 | 0 | 90 | 0 | 15 | 195 |  | 10 |  |  |  |  | Report |
| **1.2 Major Disciplines (MD)** | **25** | **750** |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. **UNIVERSITY COMPONENT**
 | 5 | 150 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **M-3 Module of project management in research work** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **UPHI 7301** | Project management for chemical engineers | 5 | 150 | 15 | 30 | 0 | 7 | 98 | 5 |  |  |  |  |  | Exam |
| 1. **Elective Component (ЕС)**
 | **10** | **300** |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **М-4**  **Module of IT-technologies and breakthrough directions in chemistry** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **PNCh7302** | Modern chemiсаl breakthroughs | 5 | 150 | 15 | 30 | 0 | 7 | 98 | 5 |  |  |  |  |  | Exam |
| **SITChChE7303** | Modern IT-technologies in chemistry and chemical engineering | 5 | 150 | 15 | 30 | 0 | 7 | 98 | 5 |  |  |  |  |  | Exam |
|  | **М-4**  **Applied Surface Science Module** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **7302SSHI** | Surface Science in Chemical Engineering | 5 | 150 | 15 | 30 | 0 | 7 | 98 | 5 |  |  |  |  |  | Exam |
| **7303PNP** | Applied Surfactant Science | 5 | 150 | 15 | 30 | 0 | 7 | 98 | 5 |  |  |  |  |  | Exam |
|  | **М-4 Petrochemical Engineering module** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **DK 7302** | Catalyst deactivation | 5 | 150 | 15 | 30 | 0 | 7 | 98 | 5 |  |  |  |  |  | Exam |
| **TKK 7303** | Fluid catalytic cracking technology | 5 | 150 | 15 | 30 | 0 | 7 | 98 | 5 |  |  |  |  |  | Exam |
|  | **М-4 Biochemical engineering module** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **PMKTI 7302** | Polymer materials for cell and tissue engineering | 5 | 150 | 15 | 30 | 0 | 7 | 98 | 5 |  |  |  |  |  | Exam |
| **SPHB 7303** | Modern problems of chemical biotechnology | 5 | 150 | 15 | 30 | 0 | 7 | 98 | 5 |  |  |  |  |  | Exam |
|  | **М-4 Electrochemical engineering module** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **APETAM 7302** | Actual problems of electrochemical technologies of active metals | 5 | 150 | 15 | 30 | 0 | 7 | 98 | 5 |  |  |  |  |  | Exam |
| **SMIES 7303** | Modern methods for the study of electrochemical systems | 5 | 150 | 15 | 30 | 0 | 7 | 98 | 5 |  |  |  |  |  | Exam |
|  | **М-4 Environmental engineering module** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **MIEI 7302** | Research methodology in environmental engineering  | 5 | 150 | 15 | 30 | 0 | 7 | 98 | 5 |  |  |  |  |  | Exam |
| **EM 7303** | Environmental monitoring | 5 | 150 | 15 | 30 | 0 | 7 | 98 | 5 |  |  |  |  |  | Exam |
|  | **М-4 Module of technology of processing natural and technogenic raw materials** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **KSM 7302** | Сomposite silicate materials | 5 | 150 | 15 | 30 | 0 | 7 | 98 | 5 |  |  |  |  |  | Exam |
| **FKM 7303** | Photocatalytic Materials | 5 | 150 | 15 | 30 | 0 | 7 | 98 | 5 |  |  |  |  |  |  |
|  | **M-3 Project management in research work** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **IP 8304** | 1. **RESEARCH PRACTICE**
 | **10** | **300** | 0 | 90 | 0 | 15 | 195 |  |  | **5** | **5** |  |  | Report |
| 1. **RESEARCH WORK**
 | **123** | **3690** |  |  |  | **258** | **3432** |  |  |  |  |  |  |  |
| 1. **DOCTOR’S STUDENT RESEARCH (MSR), INCLUDING SCIENTIFING INTERNSHIP AND DISSERTATION WRITING**
 | **123** | **3690** |  |  |  |  |  |  |  |  |  |  |  |  |
| **NIRD 1** | Research Seminar  | **26** | **780** |  |  |  |  |  | **3** | **5** | **5** | **5** | **5** | **3** |  |
| **NIRD 2** | The implementation of a Doctoral Thesis | **41** | **1230** |  |  |  |  |  | **2** | **5** | **11** | **11** | **8** | **4** |  |
| **NIRD 3** | Publication in the Proceedings of International Conferences | **17** | **510** |  |  |  |  |  |  | **4** | **4** | **3** | **6** |  |  |
| **NIRD 4** | Publication in journals recommended by CCSES or indexed by Web of Science, Scopus Databases | **31** | **930** |  |  |  |  |  |  | **6** | **5** | **6** | **6** | **8** |  |
| **NIRD 5** | Scientific Internship | **8** | **240** |  |  |  |  |  |  |  |  |  | **5** | **3** |  |
| **ADDITIONAL TYPES OF TRAINING (ATT)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Final Attestation (FA)** | **12** | **360** |  |  |  |  |  |  |  |  |  |  |  |  |
| **PhD THESIS WRITING AND DEFENCE** | **12** | **360** |  |  |  | **25** | **335** |  |  |  |  |  | **12** |  |
| **Total** | **180** | **5400** | **75** | **330** | **0** | **348** | **4647** | **30** | **30** | **30** | **30** | **30** | **30** |  |

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| ***Approved*** |  |  |
| ***Vice Rector on Academic Affairs*** |  | ***A.Khikmetov*** |
|  |  |  |
| ***Agreed*** |  |  |
| ***Director of Academic Affairs Department*** |  | ***T. Mukhitdinova*** |
|  |  |  |
| ***Head of Methodical Work and Educational Technologies Division*** |  | ***Zh. Saksenbayeva*** |
|  |  |  |
| ***Head of the Methodical Work Service*** |  | ***G.Zhakupova*** |
| ***Discussed and approved at the meeting of the Academic Council of the Faculty of Chemistry and Chemical Technology*** |  | ***Minutes*** ***№ «\_\_» \_\_\_\_\_\_\_\_\_ 2019*** |
| ***Dean of the Faculty of Chemistry and Chemical Technology*** |  | ***Kh. Tassibekov*** |
|  |  |  |
| ***The Chairman of the methodical Bureau of the faculty*** |  | ***R. Mangazbayeva*** |
| ***Head of Department*** |  | ***A. Galeyeva*** |
| ***Educational Program Coordinator*** |  | ***A. Galeyeva*** |
| ***Educational Program Authors*** |  | ***G.Vassilina******G.Seilkhanova******N.Chopabayeva*** |