**Applied mathematics in digital economics undergraduate program syllabus**

**PROGRAM OVERVIEW**

Requirements of Applied mathematics in digital economics undergraduate program

|  |  |
| --- | --- |
| **Discipline category** | **Credits (ECTS)** |
| General education disciplines | 62 |
| Compulsory University disciplines | 16 |
| Specialty’s basic disciplines | 62 |
| Profile disciplines of specialty | 60 |
| Disciplines of additional specialization | 24 |
| Internship | 12 |
| Diploma project | 12 |
| **Total** | **248** |

**GENERAL EDUCATION DISCIPLINES**

|  |  |
| --- | --- |
| **Discipline title** | **Credits (ECTS)** |
| Foreign language | 20 |
| Information and communication technologies | 5 |
| Mathematical analysis I | 5 |
| Interdisciplinary module " Individual and the world" (socio-political module, Russian and Kazakh) | 12 |
| Interdisciplinary module " Society and Politics" (modern history of Kazakhstan, socio-political module, Russian and Kazakh) | 12 |
| Physical Education | 8 |
| **Total** | **62** |

**COMPULSORY UNIVERSITY DISCIPLINES**

|  |  |
| --- | --- |
| **Discipline title** | **Credits (ECTS)** |
| Introduction to macroeconomics | 6 |
| Entrepreneurship | 5 |
| Philosophy | 5 |
| **Total** | **16** |

**SPECIALTY’S BASIC DISCIPLINES**

|  |  |
| --- | --- |
| **Discipline title** | **Credits (ECTS)** |
| Analytical geometry | 6 |
| Mathematical analysis II | 5 |
| Big Data Basics / Internet business | 5 |
| Algorithms and data structures/ Programming in R | 5 |
| Probability Theory and Mathematical Statistics | 5 |
| Mathematical modeling in Economics / Simulation modeling | 5 |
| Discrete Mathematics in Economics / Financial Mathematics | 5 |
| Applied Graph Theory | 5 |
| Deep Learning on Python / Neural network modeling | 5 |
| Time series analysis and forecasting / Computer data analysis | 5 |
| Quantitative methods of risk management / Actuarial mathematics | 5 |
| Parallel and Distributed Computing / Cryptographic information security | 6 |
| **Total** | **62** |

**SPECIALTY’S PROFILE DISCIPLINES**

|  |  |
| --- | --- |
| **Discipline title** | **Credits (ECTS)** |
| Linear algebra | 5 |
| Applied Information Theory | 5 |
| Computational Mathematics | 5 |
| Differential equations in economics | 5 |
| Game Theory and Operations Research | 5 |
| Machine Learning | 5 |
| Industrial java programming | 5 |
| Databases in Economics | 5 |
| Stochastic modeling | 5 |
| Actuarial mathematics | 5 |
| Computer modeling / Numerical methods for solving direct and inverse problems | 5 |
| Multivariate statistical methods | 5 |
| **Total** | **60** |

**ADDITIONAL SPECIALIZATION**

Students must complete 4 disciplines of additional specialization (in total, 24 credits) during 3-4 years of study. Additional specialization is selected according to the Catalogue of minors. To obtain a wider range of knowledge, it is recommended to choose an additional specialization that is not related to the student's own specialty.

**INTERNSHIP**

|  |  |
| --- | --- |
| **Internship types** | **Credits (ECTS)** |
| Educational internship | 2 |
| Industrial internship | 4 |
| Pre-diploma internship | 6 |
| **Total** | **12** |

**DIPLOMA PROJECT**

|  |  |
| --- | --- |
| **Category** | **Credits (ECTS)** |
| Research Method Disciplines | 6 |
| Writing and defense of diploma project | 6 |
| **Total** | **12** |