

## Distribution of courses per semesters and years

### Study program: Machine intelligence and robotics

| Year I     |               |                           |                |      |
|------------|---------------|---------------------------|----------------|------|
| Semester I |               |                           |                |      |
| #          | Code          | Name of course            | Hours per week | ECTS |
| Compulsory |               |                           |                |      |
| 1          | 11.3.F.1101.C | Programming 1             | 3+2            | 6    |
| 2          | 11.1.F.1102.C | Mathematics 1             | 3+2            | 6    |
| 3          | 11.9.F.1103.C | Discrete Mathematics      | 3+2            | 6    |
| 4          | 09.0.F.1104.C | Technical Communication 1 | 3+2            | 6    |
| 5          | 13.2.F.1105.C | Physics 1                 | 3+2            | 6    |

| Year I      |                  |                           |                |      |
|-------------|------------------|---------------------------|----------------|------|
| Semester II |                  |                           |                |      |
| #           | Code             | Name of course            | Hours per week | ECTS |
| Compulsory  |                  |                           |                |      |
| 1           | 11.3.F.1201.C    | Programming 2             | 3+2            | 6    |
| 2           | 11.1.F.1202.C    | Mathematics 2             | 3+2            | 6    |
| 3           | 09.0.F.1203.C    | Technical Communication 2 | 3+2            | 6    |
| 4           | 13.9.MIR.1201.MR | Physics 2                 | 3+2            | 6    |
| 5           | 11.4.MIR.1202.MR | Cognitive Science         | 3+2            | 6    |

| Year II      |                      |                                |                |      |
|--------------|----------------------|--------------------------------|----------------|------|
| Semester III |                      |                                |                |      |
| #            | Code                 | Name of course                 | Hours per week | ECTS |
| Compulsory   |                      |                                |                |      |
| 1            | 11.2.F.1301.C        | Probability and Statistics     | 3+2            | 6    |
| 2            | 11.3.F.1302.C        | Data Base Systems              | 3+2            | 6    |
| 3            | 11.3.F.1303.C        | Algorithms and Data Structures | 3+2            | 6    |
| 4            | 11.9.MIR.1301.MR     | Mathematics 3                  | 3+2            | 6    |
| Electives    |                      |                                |                |      |
| 5            | 1 course of MiE list |                                | 3+2            | 6    |

| Year II     |                      |                       |                |      |
|-------------|----------------------|-----------------------|----------------|------|
| Semester IV |                      |                       |                |      |
| #           | Code                 | Name of course        | Hours per week | ECTS |
| Compulsory  |                      |                       |                |      |
| 1           | 11.3.F.1401.C        | Software Engineering  | 3+2            | 6    |
| 2           | 11.3.F.1402.C        | Operating systems     | 3+2            | 6    |
| 3           | 11.3.F.1403.C        | Programming 3         | 3+2            | 6    |
| 4           | 06.0.MIR.1401.MR     | Sensors and Actuators | 3+2            | 6    |
| Electives   |                      |                       |                |      |
| 5           | 1 course of MiE list |                       | 3+2            | 6    |

| Year III   |                      |                       |                |      |
|------------|----------------------|-----------------------|----------------|------|
| Semester V |                      |                       |                |      |
| #          | Code                 | Name of course        | Hours per week | ECTS |
| Compulsory |                      |                       |                |      |
| 1          | 11.3.F.1501.C        | Programming 4         | 3+2            | 6    |
| 2          | 06.0.MIR.1501.MR     | Linear Systems Theory | 3+2            | 6    |
| Electives  |                      |                       |                |      |
| 3          | 1 course of MaE list |                       | 3+2            | 6    |
| 4          | 1 course of MiE list |                       | 3+2            | 6    |
| 5          | 1 course of MiE list |                       | 3+2            | 6    |

| Year III    |                      |  |                |      |
|-------------|----------------------|--|----------------|------|
| Semester VI |                      |  |                |      |
| #           | Code                 | Name of course                         | Hours per week | ECTS |
| Compulsory  |                      |  |                |      |
| 1           | 11.2.F.1601.C        | Descriptive and Inferential Statistics | 3+2            | 6    |
| 2           | 06.0.MIR.1601.MR     | Control Theory                         | 3+2            | 6    |
| Electives   |                      |  |                |      |
| 3           | 1 course of MaE list |  | 3+2            | 6    |
| 4           | 1 course of MiE list |  | 3+2            | 6    |
| 5           | 1 course of MiE list |  | 3+2            | 6    |

| Year IV      |                      |   |                |      |
|--------------|----------------------|---|----------------|------|
| Semester VII |                      |   |                |      |
| #            | Code                 | Name of course                          | Hours per week | ECTS |
| Compulsory   |                      |   |                |      |
| 1            | 11.9.F.1701.C        | R&D Methods for Science and Engineering | 3+2            | 6    |
| Electives    |                      |   |                |      |
| 2            | 11.9.F.1701.MaE*     | Industrial Internship                   | 3+2            | 6    |
| 3            | 1 course of MaE list |   | 3+2            | 6    |
| 4            | 1 course of MaE list |   | 3+2            | 6    |
| 5            | 11.9.F.1701.MiE      | Final project                           | 3+2            | 6    |

| Year IV       |                      |                       |                |      |
|---------------|----------------------|-----------------------|----------------|------|
| Semester VIII |                      |                       |                |      |
| #             | Code                 | Name of course        | Hours per week | ECTS |
| Electives     |                      |                       |                |      |
| 1             | 11.9.F.1801.MaE*     | Industrial Internship | 3+2            | 6    |
| 2             | 1 course of MaE list |                       | 3+2            | 6    |
| 3             | 1 course of MaE list |                       | 3+2            | 6    |
| 4             | 11.9.F.1802.MiE      | Final project         | 3+2            | 6    |
| 5             | 11.9.F.1801.MiE      | Final project         | 3+2            | 6    |

## Major Electives – MaE List

|    |                   |   |     |   |
|----|-------------------|---|-----|---|
| 1  | 11.2.MIR.1501.MaE | <b>Statistical Learning Systems</b>                           | 3+2 | 6 |
| 2  | 11.9.MIR.1601.MaE | <b>Stochastic Processes</b>                                   | 3+2 | 6 |
| 3  | 11.9.F.1701.MaE*  | <b>Industrial Internship</b>                                  | 3+2 | 6 |
| 4  | 11.9.MIR.1702.MaE | <b>Data mining</b>  | 3+2 | 6 |
| 5  | 04.9.MIR.1703.MaE | <b>Project Management</b>                                     | 3+2 | 6 |
| 6  | 11.9.F.1801.MaE*  | <b>Industrial Internship</b>                                  | 3+2 | 6 |
| 7  | 11.3.MIR.1802.MaE | <b>Formal Methods for Computer Science</b>                    | 3+2 | 6 |
| 8  | 11.9.MIR.1803.MaE | <b>Data Base System II</b>                                    | 3+2 | 6 |
| 9  | 11.9.F.1x01.MaE   | <b>System theory</b>  | 3+2 | 6 |
| 10 | 11.9.F.1x02.MaE   | <b>Chaos theory</b>   | 3+2 | 6 |
| 11 | 11.9.F.1x03.MaE   | <b>Advanced algorithms</b>                                    | 3+2 | 6 |
| 12 | 11.9.F.1x04.MaE   | <b>Advanced logic</b>   | 3+2 | 6 |
| 13 | 11.9.F.1x05.MaE   | <b>Model checking</b>   | 3+2 | 6 |
| 14 | 11.9.F.1x06.MaE   | <b>Discrete Mathematics 2</b>                                 | 3+2 | 6 |
| 15 | 11.9.F.1x07.MaE   | <b>Advanced calculus</b>                                      | 3+2 | 6 |
| 16 | 11.9.F.1x08.MaE   | <b>Design of integrated systems</b>                           | 3+2 | 6 |
| 17 | 11.9.F.1x09.MaE   | <b>Digital electronics</b>                                    | 3+2 | 6 |
| 18 | 11.9.F.1x10.MaE   | <b>Digital libraries</b>                                      | 3+2 | 6 |
| 19 | 11.9.F.1x11.MaE   | <b>Distance education</b>                                     | 3+2 | 6 |
| 20 | 11.9.F.1x12.MaE   | <b>e-Business</b>   | 3+2 | 6 |
| 21 | 11.9.F.1x13.MaE   | <b>e-Government</b>   | 3+2 | 6 |
| 22 | 11.9.F.1x14.MaE   | <b>Embedded systems</b>                                       | 3+2 | 6 |
| 23 | 11.9.F.1x15.MaE   | <b>Ethics and law for IT</b>                                  | 3+2 | 6 |
| 24 | 11.9.F.1x16.MaE   | <b>Fundamentals of telecommunications</b>                     | 3+2 | 6 |
| 25 | 11.9.F.1x17.MaE   | <b>Geographical information systems</b>                       | 3+2 | 6 |
| 26 | 11.9.F.1x18.MaE   | <b>Health information systems</b>                             | 3+2 | 6 |
| 27 | 11.9.F.1x19.MaE   | <b>Information society fundamentals</b>                       | 3+2 | 6 |
| 28 | 11.9.F.1x20.MaE   | <b>Innovation technologies</b>                                | 3+2 | 6 |
| 29 | 11.9.F.1x21.MaE   | <b>Innovation and sustainable systems</b>                     | 3+2 | 6 |
| 30 | 11.9.F.1x22.MaE   | <b>Internet programming</b>                                   | 3+2 | 6 |
| 31 | 11.9.F.1x23.MaE   | <b>Internet technologies</b>                                  | 3+2 | 6 |
| 32 | 11.9.F.1x24.MaE   | <b>IT supported learning</b>                                  | 3+2 | 6 |
| 33 | 11.9.F.1x25.MaE   | <b>Knowledge based systems</b>                                | 3+2 | 6 |
| 34 | 11.9.F.1x26.MaE   | <b>Knowledge management</b>                                   | 3+2 | 6 |
| 35 | 11.9.F.1x27.MaE   | <b>Knowledge systems</b>                                      | 3+2 | 6 |
| 36 | 11.9.F.1x28.MaE   | <b>Management of technical support</b>                        | 3+2 | 6 |
| 37 | 11.9.F.1x29.MaE   | <b>Management of virtual environments &amp; visualization</b> | 3+2 | 6 |

|    |                     |  |     |   |
|----|---------------------|--|-----|---|
| 38 | 11.9.F.1x30.MaE     | <b>Media and communications</b>                      | 3+2 | 6 |
| 39 | 11.9.F.1x31.MaE     | <b>Microcomputer systems</b>                         | 3+2 | 6 |
| 40 | 11.9.F.1x32.MaE     | <b>Modeling of business processes</b>                | 3+2 | 6 |
| 41 | 11.9.F.1x33.MaE     | <b>Modeling of telecommunications</b>                | 3+2 | 6 |
| 42 | 11.9.F.1x34.MaE     | <b>Natural language processing</b>                   | 3+2 | 6 |
| 43 | 11.9.F.1x35.MaE     | <b>Theory of traffic</b>                             | 3+2 | 6 |
| 44 | 11.9.F.1x36.MaE     | <b>Virtual society</b>                               | 3+2 | 6 |
| 45 | 11.9.F.1x37.MaE     | <b>Visual programming</b>                            | 3+2 | 6 |
| 46 | 11.9.F.1x38.MaE     | <b>Web design</b>                                    | 3+2 | 6 |
| 47 | 11.9.F.1x39.MaE     | <b>Bioinformatics fundamentals</b>                   | 3+2 | 6 |
| 48 | 11.9.F.1x40.MaE     | <b>Next generation networks</b>                      | 3+2 | 6 |
| 49 | 11.9.F.1x41.MaE     | <b>Identity &amp; Security Management</b>            | 3+2 | 6 |
| 50 | 11.9.F.1x42.MaE     | <b>Network Security Architectures</b>                | 3+2 | 6 |
| 51 | 11.9.F.1x43.MaE     | <b>Biomedical imaging</b>                            | 3+2 | 6 |
| 52 | 11.9.F.1x44.MaE     | <b>Biomedical instrumentation</b>                    | 3+2 | 6 |
| 53 | 11.9.F.1x45.MaE     | <b>Biomedical signal processing</b>                  | 3+2 | 6 |
| 54 | 11.9.F.1x46.MaE     | <b>Electrical circuits</b>                           | 3+2 | 6 |
| 55 | 11.9.F.1x47.MaE     | <b>Principles of biomedical engineering</b>          | 3+2 | 6 |
| 56 | 11.9.F.1x48.MaE     | <b>Game theory</b>                                   | 3+2 | 6 |
| 57 | 11.9.F.1x49.MaE     | <b>Information auditing</b>                          | 3+2 | 6 |
| 58 | 11.9.F.1x50.MaE     | <b>Optimization theory</b>                           | 3+2 | 6 |
| 59 | 11.9.F.1x51.MaE     | <b>Parallel computing</b>                            | 3+2 | 6 |
| 60 | 11.9.F.1x52.MaE     | <b>Applying UML patterns. Object oriented design</b> | 3+2 | 6 |
| 61 | 11.9.F.1x53.MaE     | <b>Cloud Computing Technologies</b>                  | 3+2 | 6 |
| 62 | 11.9.F.1x54.MaE     | <b>Patenting &amp; Protecting Technical Ideas</b>    | 3+2 | 6 |
| 63 | 11.9.F.1x55.MaE     | <b>Service Oriented Architectures</b>                | 3+2 | 6 |
| 64 | 11.9.F.1x56.MaE     | <b>Software Engineering Economics</b>                | 3+2 | 6 |
| 65 | 11.3.CSE.1501.MaE   | <b>Compiler Theory</b>                               | 3+2 | 6 |
| 66 | 11.3.CSE.1802.MaE   | <b>Software Agents</b>                               | 3+2 | 6 |
| 67 | 11.9.ISVMA.1501.MaE | <b>Graph Theory</b>                                  | 3+2 | 6 |
| 68 | 11.9.ISVMA.1601.MaE | <b>Clustering</b>                                    | 3+2 | 6 |
| 69 | 11.9.ISVMA.1802.MaE | <b>Morphological Filters</b>                         | 3+2 | 6 |
| 70 | 11.9.ISVMA.1803.MaE | <b>Image Processing</b>                              | 3+2 | 6 |
| 71 | 11.9.ITA.1501.MaE   | <b>Image and Signal Processing</b>                   | 3+2 | 6 |
| 72 | 11.9.ITA.1601.MaE   | <b>Information Theory (Cryptography)</b>             | 3+2 | 6 |
| 73 | 11.9.ITA.1702.MaE   | <b>Formal Methods for Computer Science</b>           | 3+2 | 6 |
| 74 | 11.4.ITA.1803.MaE   | <b>Artificial Intelligence</b>                       | 3+2 | 6 |
| 75 | 11.3.CNS.1501.MaE   | <b>Server and Client Systems</b>                     | 3+2 | 6 |

## Minor Electives – MiE List

|    |                 |  |     |   |
|----|-----------------|--|-----|---|
| 1  | 03.0.F.1301.MiE | <b>Art</b>                                 | 3+2 | 6 |
| 2  | 14.1.F.1302.MiE | <b>Political Science</b>                   | 3+2 | 6 |
| 3  | 14.3.F.1303.MiE | <b>Economics</b>                           | 3+2 | 6 |
| 4  | 08.0.F.1304.MiE | <b>Humanities 1</b>                        | 3+2 | 6 |
| 5  | 03.6.F.1401.MiE | <b>History of art</b>                      | 3+2 | 6 |
| 6  | 14.2.F.1402.MiE | <b>Sociology</b>                           | 3+2 | 6 |
| 7  | 04.0.F.1403.MiE | <b>Management</b>                          | 3+2 | 6 |
| 8  | 07.1.F.1404.MiE | <b>Geography</b>                           | 3+2 | 6 |
| 9  | 08.0.F.1405.MiE | <b>Humanities 2</b>                        | 3+2 | 6 |
| 10 | 08.4.F.1501.MiE | <b>Archeology</b>                          | 3+2 | 6 |
| 11 | 04.7.F.1502.MiE | <b>Marketing</b>                           | 3+2 | 6 |
| 12 | 13.9.F.1503.MiE | <b>Physics (Electricity and Magnetism)</b> | 3+2 | 6 |
| 13 | 08.3.F.1505.MiE | <b>History of art of Ohrid</b>             | 3+2 | 6 |
| 14 | 16.0.F.1506.MiE | <b>Military Science</b>                    | 3+2 | 6 |
| 15 | 13.9.F.1507.MiE | <b>Physics (Waves and Optics)</b>          | 3+2 | 6 |
| 16 | 13.9.F.1601.MiE | <b>Environmental Physics</b>               | 3+2 | 6 |
| 17 | 14.7.F.1602.MiE | <b>Anthropology</b>                        | 3+2 | 6 |
| 18 | 04.9.F.1603.MiE | <b>E-business</b>                          | 3+2 | 6 |
| 19 | 13.9.F.1604.MiE | <b>Relativity and Quantum Physics</b>      | 3+2 | 6 |
| 20 | 15.3.F.1605.MiE | <b>Public Speaking</b>                     | 3+2 | 6 |
| 21 | 03.0.F.1606.MiE | <b>Digital art and graphic design</b>      | 3+2 | 6 |
| 22 | 11.9.F.1701.MiE | <b>Final project</b>                       | 3+2 | 6 |
| 23 | 11.9.F.1802.MiE | <b>Final project</b>                       | 3+2 | 6 |
| 24 | 11.9.F.1801.MiE | <b>Final project</b>                       | 3+2 | 6 |
| 25 | 13.3.F.1x01.MiE | <b>Conceptual physics</b>                  | 3+2 | 6 |
| 26 | 08.1.F.1x02.MiE | <b>Philosophy</b>                          | 3+2 | 6 |
| 27 | 03.9.F.1x03.MiE | <b>Drawing</b>                             | 3+2 | 6 |
| 28 | 03.9.F.1x04.MiE | <b>Painting</b>                            | 3+2 | 6 |
| 29 | 09.9.F.1x05.MiE | <b>English for Academic Purposes</b>       | 3+2 | 6 |
| 30 | 09.9.F.1x06.MiE | <b>Macedonian language</b>                 | 3+2 | 6 |
| 31 | 09.9.F.1x07.MiE | <b>Linguistics</b>                         | 3+2 | 6 |
| 32 | 08.3.F.1x08.MiE | <b>History of Africa</b>                   | 3+2 | 6 |
| 33 | 08.3.F.1x09.MiE | <b>History of Asia</b>                     | 3+2 | 6 |
| 34 | 08.3.F.1x10.MiE | <b>History of America</b>                  | 3+2 | 6 |
| 35 | 08.9.F.1x11.MiE | <b>Ethnography</b>                         | 3+2 | 6 |
| 36 | 08.3.F.1x12.MiE | <b>History of Europe</b>                   | 3+2 | 6 |
| 37 | 13.3.F.1x13.MiE | <b>Introductory chemistry</b>              | 3+2 | 6 |

|    |                 |   |     |   |
|----|-----------------|---|-----|---|
| 38 | 13.3.F.1x14.MiE | <b>Advanced chemistry</b>   | 3+2 | 6 |
| 39 | 13.1.F.1x15.MiE | <b>Introductory biology</b>   | 3+2 | 6 |
| 40 | 13.1.F.1x16.MiE | <b>Advanced biology</b>   | 3+2 | 6 |
| 41 | 13.9.F.1x17.MiE | <b>Geology</b>  | 3+2 | 6 |
| 42 | 13.9.F.1x18.MiE | <b>Neurophysiology</b>  | 3+2 | 6 |
| 43 | 12.8.F.1x19.MiE | <b>Medicine and medical technology</b>                                  | 3+2 | 6 |
| 44 | 12.9.F.1x20.MiE | <b>Pharmacology</b>   | 3+2 | 6 |
| 45 | 13.9.F.1x21.MiE | <b>Ecology</b>  | 3+2 | 6 |
| 46 | 13.9.F.1x22.MiE | <b>Genetics</b>   | 3+2 | 6 |
| 47 | 09.9.F.1x23.MiE | <b>Theatre</b>  | 3+2 | 6 |
| 48 | 09.9.F.1x24.MiE | <b>Poetry</b>   | 3+2 | 6 |
| 49 | 09.9.F.1x25.MiE | <b>Commercializing Technology,<br/>Venturing &amp; Entrepreneurship</b> | 3+2 | 6 |