

**Course overview**

| Year I         |                  |                           |  |              |
|----------------|------------------|---------------------------|--|--------------|
| Semester I     |                  |                           |  |              |
| No.            | Code             | Course                    | Total Numbers of Lecturers and Tutorials | ECTS Credits |
| Core courses   |                  |                           |  |              |
| 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            |
| Minor elective |                  |                           |  |              |
| 5              | 13.2.F.1101.C    | Physics                   | 3+2                                      | 6            |
| Semester II    |                  |                           |  |              |
| No.            | Code             | Course                    | Total Numbers of Lecturers and Tutorials | ECTS Credits |
| Core           |                  |                           |  |              |
| 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              | 11.3.CNS.1201.MR | Network Architecture      | 3+2                                      | 6            |
| 5              | 11.3.CNS.1202.MR | Digital Signal Processing | 3+2                                      | 6            |

| Year II         |                                   |                                  |  |              |
|-----------------|-----------------------------------|----------------------------------|--|--------------|
| Semester III    |                                   |                                  |  |              |
| No.             | Code                              | Course                           | Total Numbers of Lecturers and Tutorials | ECTS Credits |
| Core courses    |                                   |                                  |  |              |
| 1               | 11.2.F.1301.C                     | Programming 3                    | 3+2                                      | 6            |
| 2               | 11.3.F.1302.C                     | Database Systems 1               | 3+2                                      | 6            |
| 3               | 11.3.F.1303.C                     | Algorithms and Data Structures 1 | 3+2                                      | 6            |
| 4               | 11.3.CNS.1301.MR                  | Communication Protocols          | 3+2                                      | 6            |
| Elective Course |                                   |                                  |  |              |
| 5               | 1 course from Minor Elective List |                                  |  |              |
| Semester IV     |                                   |                                  |  |              |

| No.                   | Code                              | Course                           | Total Numbers of Lecturers and Tutorials | ECTS Credits |
|-----------------------|-----------------------------------|----------------------------------|--|--------------|
| Core courses          |                                   |                                  |  |              |
| 1                     | 11.3.F.1401.C                     | Database Systems 2               | 3+2                                      | 6            |
| 2                     | 11.3.F.1402.C                     | Algorithms and Data Structures 2 | 3+2                                      | 6            |
| 3                     | 11.2.F.1403.C                     | Probability and Statistics       | 3+2                                      | 6            |
| 4                     | 11.3.CNS.1401.MR                  | Wireless Technology              | 3+2                                      | 6            |
| Minor Elective Course |                                   |                                  |  |              |
| 5                     | 1 course from Minor Elective List |                                  |  |              |

| Year III              |  |                           |  |              |
|-----------------------|--|---------------------------|--|--------------|
| Semester V            |  |                           |  |              |
| No.                   | Code   | Course                    | Total Numbers of Lecturers and Tutorials | ECTS Credits |
| Core Courses          |  |                           |  |              |
| 1                     | 11.3.F.1501.C  | Programming 4             | 3+2                                      | 6            |
| 2                     | 11.9.CNS.1501.MR   | Stochastic Process        | 3+2                                      | 6            |
| Major Elective Course |  |                           |  |              |
| 3                     | 1 course from Major Elective List (Client/server system) |                           |  |              |
| Minor Elective Course |  |                           |  |              |
| 4                     | 1 course from Minor Elective List                        |                           |  |              |
| 5                     | 1 course from Minor Elective List                        |                           |  |              |
| Semester VI           |  |                           |  |              |
| No.                   | Code   | Course                    | Total Numbers of Lecturers and Tutorials | ECTS Credits |
| Core Courses          |  |                           |  |              |
| 1                     | 11.3.CNS.1601.MR   | Wireless Sensors Networks | 3+2                                      | 6            |
| 2                     | 11.9.CNS.1602.MR   | Coding Theory             | 3+2                                      | 6            |
| Major Elective Course |  |                           |  |              |
| 3                     | 1 course from Major Elective List (Cryptography)         |                           |  |              |
| Minor Elective Course |  |                           |  |              |
| 4                     | 1 course from Minor Elective List                        |                           |  |              |
| 5                     | 1 course from Minor Elective List                        |                           |  |              |

| Year IV                                       |   |                                |  |              |
|---|---|--------------------------------|--|--------------|
| Semester VII                                  |   |                                |  |              |
| No.   | Code  | Course                         | Total Numbers of Lecturers and Tutorials | ECTS Credits |
| Core Course                                   |   |                                |  |              |
| 1   | 11.3.CNS.1701.MR  | Network Security Architectures | 3+2                                      | 6            |
| Two Major Elective Course                     |   |                                |  |              |
| 2   | 1 course from Major Elective List (Data Mining)                           |                                |  |              |
| 3   | 1 course from Major Elective List (Project Management)                    |                                |  |              |
| Two Final Projects from Major Elective Course |   |                                |  |              |
| 4   | Final Project from MaE List   |                                |  |              |
| 5   | Final Project from MaE List   |                                |  |              |
| Semester VIII                                 |   |                                |  |              |
| No.   | Code  | Course                         | Total Numbers of Lecturers and Tutorials | ECTS Credits |
| Core Courses                                  |   |                                |  |              |
| 1   | 11.3.F.1801.C   | Advanced Algorithms            | 3+2                                      | 6            |
| 2   | 11.9.F.1802.C   | Models and Simulations         | 3+2                                      | 6            |
| Two Major Elective Course                     |   |                                |  |              |
| 3   | 1 course from Major Elective List (Cloud Computing Technologies)          |                                |  |              |
| 4   | 1 course from Major Elective List (Telecommunication Networks Management) |                                |  |              |
| Final Project from Major Elective Course      |   |                                |  |              |
| 5   | Final Project from Major Elective List                                    |                                |  |              |

**List of Minor Elective Courses**

| No. | Code            | Course                                | Total Numbers of Lecturers and Tutorials | ECTS Credits |
|-----|-----------------|---------------------------------------|--|--------------|
| 1   | 13.9.F.1101.MiE | <b>Physics</b>                        | 3+2                                      | 6            |
| 2   | 03.0.F.1301.MiE | <b>Digital medium and Photography</b> | 3+2                                      | 6            |
| 3   | 14.1.F.1302.MiE | <b>Political Sciences</b>             | 3+2                                      | 6            |
| 4   | 14.3.F.1303.MiE | <b>Economics</b>                      | 3+2                                      | 6            |
| 5   | 08.0.F.1304.MiE | <b>Humanity 1</b>                     | 3+2                                      | 6            |

|    |                 |  |     |   |
|----|-----------------|--|-----|---|
| 6  | 03.6.F.1401.MiE | <b>History of Arts</b>                       | 3+2 | 6 |
| 7  | 14.2.F.1402.MiE | <b>Sociology</b>                             | 3+2 | 6 |
| 8  | 04.0.F.1403.MiE | <b>Management</b>                            | 3+2 | 6 |
| 9  | 04.0.F.1404.MiE | <b>Entrepreneurship</b>                      | 3+2 | 6 |
| 10 | 08.0.F.1405.MiE | <b>Humanity 2</b>                            | 3+2 | 6 |
| 11 | 14.7.F.1501.MiE | <b>Anthropology</b>                          | 3+2 | 6 |
| 12 | 04.7.F.1502.MiE | <b>Marketing</b>                             | 3+2 | 6 |
| 13 | 13.9.F.1503.MiE | <b>Ecology</b>                               | 3+2 | 6 |
| 14 | 16.0.F.1504.MiE | <b>Culture Heritage</b>                      | 3+2 | 6 |
| 15 | 16.0.F.1506.MiE | <b>Military Sciences</b>                     | 3+2 | 6 |
| 16 | 10.0.F.1507.MiE | <b>Ethics and IT Law</b>                     | 3+2 | 6 |
| 17 | 14.7.F.1601.MiE | <b>Archeology</b>                            | 3+2 | 6 |
| 18 | 04.9.F.1602.MiE | <b>E-business</b>                            | 3+2 | 6 |
| 19 | 13.9.F.1603.MiE | <b>Geography information systems<br/>GIS</b> | 3+2 | 6 |
| 20 | 15.3.F.1604.MiE | <b>Public Speaking</b>                       | 3+2 | 6 |
| 21 | 03.0.F.1605.MiE | <b>Graphic design</b>                        | 3+2 | 6 |
| 22 | 03.2.F.1606.MiE | <b>Music</b>                                 | 3+2 | 6 |
| 23 | 09.9.F.1607.MiE | <b>Macedonian Language</b>                   | 3+2 | 6 |
| 24 | 13.9.F.1608.MiE | <b>Genetics</b>                              | 3+2 | 6 |
| 25 | 03.3.F.1609.MiE | <b>Theatre</b>                               | 3+2 | 6 |

**List of Major Elective Courses**

| No. | Code            | Course                    | Total Numbers of Lecturers and Tutorials | ECTS Credits |
|-----|-----------------|---------------------------|--|--------------|
| 1   | 11.3.F.1x01.MaE | Client/server system      | 3+2                                      | 6            |
| 2   | 11.9.F.1x02.MaE | Cryptography              | 3+2                                      | 6            |
| 3   | 11.9.F.1x03.MaE | Data Mining               | 3+2                                      | 6            |
| 4   | 04.9.F.1x04.MaE | Project Management        | 3+2                                      | 6            |
| 5   | 11.9.F.1x05.MaE | Computer components       | 3+2                                      | 6            |
| 6   | 11.9.F.1x06.MaE | Systems Theory            | 3+2                                      | 6            |
| 7   | 11.9.F.1x07.MaE | Models and Simulations    | 3+2                                      | 6            |
| 8   | 11.9.F.1x08.MaE | Discrete mathematics 2    | 3+2                                      | 6            |
| 9   | 11.9.F.1x09.MaE | Integrated Systems Design | 3+2                                      | 6            |
| 10  | 11.9.F.1x10.MaE | Digital Electronics       | 3+2                                      | 6            |
| 11  | 11.9.F.1x11.MaE | Digital Libraries         | 3+2                                      | 6            |
| 12  | 11.9.F.1x12.MaE | Distance Learning Systems | 3+2                                      | 6            |
| 13  | 04.0.F.1x13.MaE | E-commerce                | 3+2                                      | 6            |
| 14  | 14.0.F.1x14.MaE | E-government              | 3+2                                      | 6            |

|    |                 |  |     |   |
|----|-----------------|--|-----|---|
| 15 | 11.9.F.1x15.MaE | Embedded Systems                                       | 3+2 | 6 |
| 16 | 04.2.F.1x16.MaE | Innovation Technologies                                | 3+2 | 6 |
| 17 | 04.9.F.1x17.MaE | Commercialization of Technologies and Entrepreneurship | 3+2 | 6 |
| 18 | 11.9.F.1x18.MaE | Internet Programming                                   | 3+2 | 6 |
| 19 | 11.9.F.1x19.MaE | Internet Technologies                                  | 3+2 | 6 |
| 20 | 11.9.F.1x20.MaE | Knowledge Based Systems                                | 3+2 | 6 |
| 21 | 11.9.F.1x21.MaE | Knowledge Management                                   | 3+2 | 6 |
| 22 | 11.9.F.1x22.MaE | Knowledge Systems                                      | 3+2 | 6 |
| 23 | 11.9.F.1x23.MaE | Engineering Management                                 | 3+2 | 6 |
| 24 | 11.3.F.1x24.MaE | Telecommunication Networks Management                  | 3+2 | 6 |
| 25 | 04.2.F.1x25.MaE | Management of Technologies and Innovation              | 3+2 | 6 |
| 26 | 04.2.F.1x26.MaE | ICT Industry and Management                            | 3+2 | 6 |
| 27 | 11.9.F.1x27.MaE | Microcomputers Systems                                 | 3+2 | 6 |
| 28 | 11.9.F.1x28.MaE | Modeling of Business Processes                         | 3+2 | 6 |
| 29 | 11.9.F.1x29.MaE | Language Processing                                    | 3+2 | 6 |
| 30 | 11.9.F.1x30.MaE | Virtual Society  | 3+2 | 6 |
| 31 | 11.9.F.1x31.MaE | Visual Programming                                     | 3+2 | 6 |
| 32 | 11.9.F.1x32.MaE | Web Design   | 3+2 | 6 |
| 33 | 11.9.F.1x33.MaE | Bioinformatics   | 3+2 | 6 |
| 34 | 11.9.F.1x34.MaE | Security and Identity Management                       | 3+2 | 6 |
| 35 | 11.9.F.1x35.MaE | Electric circuits                                      | 3+2 | 6 |
| 36 | 11.9.F.1x36.MaE | Game Theory  | 3+2 | 6 |
| 37 | 11.9.F.1x37.MaE | Optimization Theory                                    | 3+2 | 6 |
| 38 | 11.9.F.1x38.MaE | Parallel data processing                               | 3+2 | 6 |
| 39 | 11.9.F.1x39.MaE | UML designed models                                    | 3+2 | 6 |
| 40 | 11.9.F.1x40.MaE | Cloud Computing Technologies                           | 3+2 | 6 |
| 41 | 11.9.F.1x41.MaE | Copyrights and technical ideas protection              | 3+2 | 6 |
| 42 | 11.9.F.1x42.MaE | Software engineering economics                         | 3+2 | 6 |