BIOMEDICAL ENGINEERING, 1st CYCLE (BACHELOR)
SCOPE OF DIPLOMA: DESIGN OF BIOMECHATRONIC DEVICES

| | | Hours | | | | | I | | | | | | II | | | | | | III | | | | | | IV | | | | | | V | | | | | | VI | | | | | | VII | | | | |
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| | **Basic courses** | **Total** | **W** | **C** | **L** | **P** | **W** | **C** | **L** | **P** | **E** | **ECTS** | **W** | **C** | **L** | **P** | **E** | **ECTS** | **W** | **C** | **L** | **P** | **E** | **ECTS** | **W** | **C** | **L** | **P** | **E** | **ECTS** | **W** | **C** | **L** | **P** | **E** | **ECTS** | **W** | **C** | **L** | **P** | **E** | **ECTS** | **W** | **C** | **L** | **P** | **ECTS** |
| 1 | Physical Education | 60 | | 60 | | | | 30 | | | | | | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Foreign Language | 120 | | 120 | | | | 30 | | | | 2 | | 30 | | | | 2 | | 30 | | | | 2 | | 30 | | | E | 2 | | | | | | | | | | | | | | | | |
| 3 | Techniques And Tools For Communication | 30 | 15 | 15 | | | 15 | 15 | | | | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Introduction To Entrepreneuship | 30 | 30 | | | | | | | | | | 30 | | | | | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | Intellectual Property Protection | 15 | 15 | | | | | | | | | | | | | | | | 15 | | | | | 1 | | | | | | | | | | | | | | | | | | | | | | |
| 6 | Mathematics For Engineers | 30 | | 30 | | | | 30 | | | | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | Mathematics | 150 | 60 | 90 | | | | | | | | | 30 | 60 | | | E | 7 | 30 | 30 | | | E | 4 | | | | | | | | | | | | | | | | | | | | | | |
| 8 | Informatics And Basics Of Programming | 30 | 10 | | 20 | | 10 | | 20 | | E | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | Engineering Graphics | 30 | | | 30 | | | | 30 | | | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | Fundamentals Of Biomedical Engineering | 105 | 35 | | 70 | | 35 | | 70 | | E | 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | Physics | 105 | 30 | 60 | 15 | | | | | | | | | 30 | | | | 3 | 15 | 30 | | | | 4 | 15 | | 15 | | | 3 | | | | | | | | | | | | | | | | |
| 12 | Chemistry | 25 | 10 | | 15 | | 10 | | 15 | | | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | Introduction to Anatomy and Physiology | 20 | | 20 | | | | | | | | | | | | | | | | 20 | | | | 2 | | | | | | | | | | | | | | | | | | | | | | |
| 14 | Biomedical Data | 60 | | | 60 | | | | | | | | | | 60 | | E | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | Engineering Technologies In Medicine And Sports | 60 | 30 | | 30 | | | | | | | | 30 | | 30 | | E | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | Iintroduction To Problem Based Learning | 45 | | | | 45 | | | | | | | | | | 45 | | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | Elective Course | 150 | 150 | | | | | | | | | | 30 | | | | | 2 | 30 | | | | | 2 | 30 | | | | | 2 | 30 | | | | | 2 | 30 | | | | | 2 | | | | | |
| 18 | Practice | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19 | Bachelor Project | 45 | | | | 45 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 45 | 15 |
| | **DESIGN OF BIOMECHATRONIC DEVICES** | **1110** | **385** | **395** | **240** | **90** | **70** | **105** | **135** | | | **28** | **120** | **150** | **90** | **45** | | **32** | **90** | **110** | | | | **15** | **45** | **30** | **15** | | | **7** | **30** | | | | | **2** | **30** | | | | | **6** | | | | **45** | **15** |
| M1 | **Basics of Mechanical Engineering** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Mechanics | 60 | 30 | | | 30 | | | | | | | | | | | | | 30 | | | 30 | E | 5 | | | | | | | | | | | | | | | | | | | | |
| 2 | Strength of Materials | 75 | 15 | | 30 | 30 | | | | | | | | | | | | | | | | | | | 15 | | 30 | 30 | E | 6 | | | | | | | | | | | | | | |
| 3 | Multibody Dynamics | 45 | 15 | | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | 15 | | 30 | | | 4 | | | | | | | | |
| M2 | **Engineering Design** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Construction record | 30 | | | 30 | | | | | | | | | | | | | | | | 30 | | | 2 | | | | | | | | | | | | | | | | | | | | |
| 5 | Design and optimization of medical equipment | 60 | 15 | | | 45 | | | | | | | | | | | | | | | | | | | 15 | | | 45 | | 4 | | | | | | | | | | | | | | |
| 6 | Basics of machine construction | 90 | 30 | | | 60 | | | | | | | | | | | | | 15 | | | 15 | | 2 | 15 | | | 30 | E | 4 | | | | 15 | | 2 | | | | | | | | |
| 7 | Computer-Aided Design | 30 | | | 30 | | | | | | | | | | | | | | | | | | | | | | 30 | | | 2 | | | | | | | | | | | | | | |
| 8 | Fundamentals of Materials Science | 30 | 15 | | 15 | | | | | | | | | | | | | | 15 | | 15 | | | 2 | | | | | | | | | | | | | | | | | | | | |
| 9 | Certification of Medical Devices | 45 | 15 | | | 30 | | | | | | | | | | | | | | | | | | | | | | | | | 15 | | | 30 | | 2 | | | | | | | | |
| M3 | **Applied Biomechanics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | Structure and Functions of the Human Musculoskeletal System | 45 | 30 | | | 15 | | | | | | | | | | | | | | | | | | | 30 | | | 15 | | 3 | | | | | | | | | | | | | | |
| 11 | Engineering Biomechanics | 60 | 30 | | 30 | | | | | | | | | | | | | | | | | | | | 30 | | 30 | | | 4 | | | | | | | | | | | | | | |
| 12 | Movement Analysis of Living Organisms | 60 | 15 | | 45 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 15 | | 45 | | | 4 | | | | |
| 13 | Sports Biomechanics | 45 | 15 | | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 15 | | 30 | | E | 3 | | | | |
| 14 | Biomechanics of Sports Injuries | 45 | 15 | | | 30 | | | | | | | | | | | | | | | | | | | | | | | | | 15 | | | 30 | | 2 | | | | | | | | |
| 15 | Modeling and Identification of Loads in the Human Musculoskeletal System | 45 | 15 | | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 15 | | 30 | | 3 |
| M4 | **Engineering Calculations** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | Engineering Calculations and Optimization Methods | 45 | 15 | | 30 | | | | | | | | | | | | | | 15 | | 30 | | | 4 | | | | | | | | | | | | | | | | | | | | |
| 17 | Research Methodology and Statistical Analysis of Biomedical Data | 45 | 15 | | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 15 | | 30 | | | 3 | | | | |
| M5 | **Modern Technologies Supporting Rehabilitation and Sport** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 | Modern Methods of Physiotherapy in the Treatment of Diseases and Dysfunctions of the Musculoskeletal System | 45 | 15 | | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | 15 | | 30 | | E | 4 | | | | | | | | |
| 19 | Engineering Assistance in the Selection and Design of Orthopedic Equipment | 45 | 15 | | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 15 | | 30 | | 3 |
| 20 | Medical Robots | 45 | 15 | | | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 15 | | | 30 | 2 |
| 21 | Computer-Aided Systems for Diagnosing and Treatment the Human Musculoskeletal System | 45 | 15 | | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 15 | | 30 | | 2 |
| 22 | Engineering Support for Manual Therapy, Speech Therapy and Oligophrenopedagogics | 45 | 15 | | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 15 | | 30 | | | 3 | | | | |
| M6 | **Control Systems for Biomechatronic Devices** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 23 | Biomedical Signals Processing | 30 | | | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | 30 | | | 2 | | | | | | | | |
| 24 | Fundamentals of Programming of Biomechatronic Devices | 60 | 15 | | 45 | | | | | | | | | | | | | | | | | | | | | | | | | | 15 | | 45 | | E | 5 | | | | | | | | |
| M7 | **Computer Systems for Design and Engineering Analysis** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25 | CAD/CAM Engineering Support Systems | 90 | | | 90 | | | | | | | | | | | | | | | | | | | | | | | | | | | | 45 | | | 4 | | 45 | | E | 3 | | | | |
| 26 | CAS Systems | 45 | | | 45 | | | | | | | | | | | | | | | | | | | | | | | | | | | | 45 | | | 3 | | | | | | | | |
| 27 | Reverse Engineering and CAE Systems | 60 | | | 60 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 60 | | | 3 | | | | |
| M8 | **Virtual Reality Technologies in Biomechatronics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 28 | Basics of Spatial Modeling in Virtual Reality | 90 | 15 | | 75 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 15 | | 30 | | | 3 | | 45 | | 3 |
| 29 | Modeling in the Virtual Reality Environment | 60 | | | 60 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 30 | | | 2 | | 30 | | 2 |
| | | **1515** | **390** | | **855** | **270** | | | | | | | | | | | | | **75** | | **75** | **45** | | **15** | **105** | | **90** | **120** | | **23** | **75** | | **225** | **75** | | **28** | **75** | | **300** | | | **24** | **60** | | **165** | **30** | **15** |
| | **Total** | **2625** | **775** | **395** | **1095** | **360** | **70** | **105** | **135** | | | **28** | **120** | **150** | **90** | **45** | | **32** | **165** | **110** | **75** | **45** | | **30** | **150** | **30** | **105** | **120** | | **30** | **105** | | **225** | **75** | | **30** | **105** | | **300** | | | **30** | **60** | | **165** | **75** | **30** |
| | | **Total/Hours per week** | | | | | | | **310** | | | **21** | | | **405** | | | **27** | | | **395** | | | **26** | | | **405** | | | **27** | | | **405** | | | **27** | | | **405** | | | **27** | | | **300** | | | **20** |

**Programme valid from the academic year: 2025/2026**