<table>
<thead>
<tr>
<th>4-year Bachelor Degree</th>
<th>5-year Engineer Degree</th>
<th>1-year Engineer Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Education (48)</strong></td>
<td><strong>Professional Mandatory (70)</strong></td>
<td><strong>Mandatory Courses (35)</strong></td>
</tr>
<tr>
<td>Basic Practicum (2)</td>
<td>Electromagnetic Fields and Waves (2)</td>
<td>Electronics Engineering (13)</td>
</tr>
<tr>
<td>Electronics and Telecommunications Engineering (2)</td>
<td>Systems and Control (2)</td>
<td>Embedded System Design (12)</td>
</tr>
<tr>
<td>Basic Practicum (2)</td>
<td>Network Analysis (2)</td>
<td>Advanced Programming (4)</td>
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<tr>
<td>Introduction to Electronics and Telecommunications Engineering (2)</td>
<td>Devices and Circuits (2)</td>
<td>Computer Architecture (4)</td>
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<tr>
<td>Project I (2)</td>
<td>Multisim (2)</td>
<td>Digital Image Processing (3)</td>
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<tr>
<td></td>
<td>Project II (2)</td>
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<tr>
<td><strong>Optimal (35)</strong></td>
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<tr>
<td></td>
<td>Project III (3)</td>
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<td>Project IV (3)</td>
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<td>Project V (3)</td>
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<tr>
<td><strong>Graduation Project</strong></td>
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<tr>
<td></td>
<td>Graduation Internship (2)</td>
<td></td>
</tr>
<tr>
<td>5 minors: Electronic Engineering, Computer Engineering, Communication Engineering, Aerospace Electronic Engineering, Biomedical Engineering</td>
<td></td>
<td>Graduation Project (6)</td>
</tr>
</tbody>
</table>

1) 5 minors: Electronic Engineering, Computer Engineering, Communication Engineering, Aerospace Electronic Engineering, Biomedical Engineering
2) Number in brackets are the number of credits
3) (*) is the mandatory course

**Bachelor Degree in Electronics and Telecommunications (4 years)**

**Engineer Degree in Electronics and Telecommunications (5 years)**

**1-year Engineer Degree**

**Graduation Project**

1. Electronics Engineering (13)
2. Computer Architecture (4)
3. Digital Image Processing (3)
4. Embedded System Design (12)
5. Advanced Programming (4)
6. Computer Networks (5)
7. Operating Systems (5)
8. Cryptography (5)
10. Communications and Network Systems (6)
11. Operating Systems (5)
12. Cryptography (5)
13. Telecommunication Systems (6)

**Optional (6)**

1. Mobile Communications (2)
2. Communication Networks (3)
3. Communication Networks (3)
4. Communication Networks (3)
5. Communication Networks (3)
6. Communication Networks (3)
### 4-year Bachelor Degree in Electronics and Telecommunications

<table>
<thead>
<tr>
<th>Mandatory (44)</th>
<th>Optional (4)</th>
<th>Evaluation Project</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic courses</strong>:</td>
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</tr>
<tr>
<td>Introduction to Electronics and Telecommunications Engineering (2)</td>
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<tr>
<td>Telecommunications (2)</td>
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<tr>
<td>Digital Electronics (3)</td>
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<tr>
<td>Analog Electronics (3)</td>
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<tr>
<td>Operating Systems (2)</td>
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<tr>
<td>Operating System Fundamentals (2)</td>
<td></td>
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<tr>
<td>C/C++ Programming (2)</td>
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<tr>
<td>Data Structures and Algorithms (2)</td>
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<tr>
<td>Project I (2)</td>
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<tr>
<td>Project II (2)</td>
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<tr>
<td><strong>3 minors</strong>:</td>
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<tr>
<td>Electronic Engineering</td>
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<tr>
<td>Communication Engineering</td>
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<tr>
<td>Biomedical Engineering</td>
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</tbody>
</table>

1. (*) is the mandatory course
2. Numbers in brackets are the number of credits
3. Optional

### 1.5-year Master of Science (Application-oriented) (45)

<table>
<thead>
<tr>
<th>Mandatory (45)</th>
<th>Optional (15)</th>
<th>Graduation (15)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic courses</strong>:</td>
<td></td>
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<tr>
<td>Artificial Intelligence and Applications (3)</td>
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<tr>
<td>Optical Biomedicine (3)</td>
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<tr>
<td>Biomechanics and Application (2)</td>
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<tr>
<td>Functional Recovery Therapy (2)</td>
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<tr>
<td>Radiation Therapy Planning (2)</td>
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</tr>
<tr>
<td>Medical Equipment Management (3)</td>
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<tr>
<td>Advanced Medical Imaging Technology (3)</td>
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<tr>
<td>Research Methodology (2)</td>
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<tr>
<td><strong>Advance courses for all directions</strong>:</td>
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<tr>
<td>Machine Learning (3)**</td>
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<tr>
<td>Advanced Optical Engineering System (3)**</td>
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<tr>
<td>Advanced Optics (3)**</td>
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<tr>
<td>Advanced Information Theory and Channel Coding (3)**</td>
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<tr>
<td>System Modeling (2)</td>
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<tr>
<td><strong>Graduation Thesis (15)</strong></td>
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</table>

4. (*) is the mandatory course
5. () is the number of credits
6. (**): ARTIFICIAL INTELLIGENCE AND APPLICATIONS
<table>
<thead>
<tr>
<th>General Education (4)</th>
<th>Mandatory (4)</th>
<th>1.5-year Master of Science</th>
<th>4-year Bachelor Degree in Electronics and Telecommunications</th>
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<tbody>
<tr>
<td>Algebra (4)</td>
<td>Data Structures and Algorithms (4)</td>
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<tr>
<td>Statistics (4)</td>
<td>Operating Systems (3)</td>
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<tr>
<td>Calculus I, II, III</td>
<td>Computer Networks (3)</td>
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<tr>
<td>English (4)</td>
<td>Digital Signal Processing (4)</td>
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<tr>
<td>Introduction to Computer Science (4)</td>
<td>Information System Analysis &amp; Design (5)</td>
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</tr>
<tr>
<td>Social science and Polities (3)</td>
<td>Software Engineering (4)</td>
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<tr>
<td></td>
<td>Basic Practicum (2)</td>
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<td>Project I (2)</td>
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<td>Project II (2)</td>
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<td>Basic Practicum (2)</td>
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<td>Project II (2)</td>
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<tr>
<td></td>
<td>Project III (2)</td>
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</tbody>
</table>

1) (*) is the mandatory course
2) Number in brackets are the number of credits
3) "I" is the mandatory course

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**Bachelor of Science (45) (Research-oriented)**

**Basic Courses (12-15)**
- Electronics Engineering (2-3)
- Advanced Electrical Signal Processing (1)
- Advanced Optical Engineering (1)
- Digital Systems Design (1)
- Advanced Digital Signal Processing (1)

**Advance Courses (12-15)**
- Research Project I (3-5)
- Research Project II (3-5)
- Research Project III (3-5)
- Research Project IV (3-5)
- Research Project V (3-5)
- Research Project VI (3-5)
- Research Project VII (3-5)
- Research Project VIII (3-5)
- Research Project IX (3-5)
- Research Project X (3-5)

**Graduation Project (15)**
- Master's Thesis (15)

---

**Master of Science (45) (Research-oriented)**

**Bachelor of Science (45) (Research-oriented)**

**Basic Courses (12-15)**
- Electronics Engineering (2-3)
- Advanced Electrical Signal Processing (1)
- Advanced Optical Engineering (1)
- Digital Systems Design (1)
- Advanced Digital Signal Processing (1)

**Advance Courses (12-15)**
- Research Project I (3-5)
- Research Project II (3-5)
- Research Project III (3-5)
- Research Project IV (3-5)
- Research Project V (3-5)
- Research Project VI (3-5)
- Research Project VII (3-5)
- Research Project VIII (3-5)
- Research Project IX (3-5)
- Research Project X (3-5)

**Graduation Project (15)**
- Master's Thesis (15)

---

**Master of Science (45) (Research-oriented)**

**Bachelor of Science (45) (Research-oriented)**

**Basic Courses (12-15)**
- Electronics Engineering (2-3)
- Advanced Electrical Signal Processing (1)
- Advanced Optical Engineering (1)
- Digital Systems Design (1)
- Advanced Digital Signal Processing (1)

**Advance Courses (12-15)**
- Research Project I (3-5)
- Research Project II (3-5)
- Research Project III (3-5)
- Research Project IV (3-5)
- Research Project V (3-5)
- Research Project VI (3-5)
- Research Project VII (3-5)
- Research Project VIII (3-5)
- Research Project IX (3-5)
- Research Project X (3-5)

**Graduation Project (15)**
- Master's Thesis (15)

---

**Master of Science (45) (Research-oriented)**

**Bachelor of Science (45) (Research-oriented)**

**Basic Courses (12-15)**
- Electronics Engineering (2-3)
- Advanced Electrical Signal Processing (1)
- Advanced Optical Engineering (1)
- Digital Systems Design (1)
- Advanced Digital Signal Processing (1)

**Advance Courses (12-15)**
- Research Project I (3-5)
- Research Project II (3-5)
- Research Project III (3-5)
- Research Project IV (3-5)
- Research Project V (3-5)
- Research Project VI (3-5)
- Research Project VII (3-5)
- Research Project VIII (3-5)
- Research Project IX (3-5)
- Research Project X (3-5)

**Graduation Project (15)**
- Master's Thesis (15)

---

**Master of Science (45) (Research-oriented)**

**Bachelor of Science (45) (Research-oriented)**

**Basic Courses (12-15)**
- Electronics Engineering (2-3)
- Advanced Electrical Signal Processing (1)
- Advanced Optical Engineering (1)
- Digital Systems Design (1)
- Advanced Digital Signal Processing (1)

**Advance Courses (12-15)**
- Research Project I (3-5)
- Research Project II (3-5)
- Research Project III (3-5)
- Research Project IV (3-5)
- Research Project V (3-5)
- Research Project VI (3-5)
- Research Project VII (3-5)
- Research Project VIII (3-5)
- Research Project IX (3-5)
- Research Project X (3-5)

**Graduation Project (15)**
- Master's Thesis (15)
Information Theory (3)

- Basic concepts in Information Theory, entropy, channel capacity, source coding, channel coding

Electromagnetic field (3)

- The electromagnetic field: Introduction to electromagnetic field. Basic laws of electromagnetic field
- Thorsen’s electromagnetic field: Basic laws of electromagnetic field
- Maxwell’s electromagnetic field: Maxwell's equations, Energy of electromagnetic field
- Propagation phenomena: Propagation phenomena of electromagnetic waves
- Wave propagation in different media: Reflection, refraction, diffraction, skin effect
- High-frequency propagation phenomena: Propagation in various environments

Optical Communications (3)

- Optical fibers: Review of fiber optics, propagation phenomena, signal propagation, signal distortion
- Optical fibers: Review of fiber optics, propagation phenomena, signal propagation, signal distortion
- Optical fibers: Review of fiber optics, propagation phenomena, signal propagation, signal distortion

Satellite Communications (3)

- Introduction to satellite communications, satellite network architecture, system design
- Antenna: Review of electromagnetic radiation, characteristics of a radiation source
- Transmission media: Overview of transmission media
- Wireless communications: Overview of wireless communications

Mobile Communication Systems (3)

- Introduction to mobile communication systems, concepts, system design
- Antenna and propagation: Concepts, system design
- Satellite communications: Overview of satellite communications

Internet and Propagation (3)

- Internet and propagation: Introduction to internet and propagation concepts
- Introduction to internet and propagation concepts
- Introduction to internet and propagation concepts

Digital Communications (3)

- Digital communications: Introduction to digital communications
- Introduction to digital communications
- Introduction to digital communications

Digital Signal Processing (3)

- Digital signal processing: Introduction to digital signal processing
- Introduction to digital signal processing
- Introduction to digital signal processing

Operating System (3)

- Operating system: Introduction to operating systems
- Operating system: Introduction to operating systems
- Operating system: Introduction to operating systems

Computer Networks (3)

- Computer networks: Introduction to computer networks
- Computer networks: Introduction to computer networks
- Computer networks: Introduction to computer networks

Security Theory (3)

- Security theory: Introduction to security theory
- Security theory: Introduction to security theory
- Security theory: Introduction to security theory

Electromagnetism (3)

- Electromagnetism: Introduction to electromagnetism
- Electromagnetism: Introduction to electromagnetism
- Electromagnetism: Introduction to electromagnetism

Telecommunication Systems (3)

- Telecommunication systems: Introduction to telecommunication systems
- Telecommunication systems: Introduction to telecommunication systems
- Telecommunication systems: Introduction to telecommunication systems
<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio Communications (3)</td>
<td>This course focuses on physical layer and MAC layer for radio communications, in the basis of other courses including mobile communications, satellite communications, broadcast technology, reception positioning, microwave engineering and antennas. Radio system, structural radio system, the structure of receiver and transmitter. Theory of radio channel, multi-path diversity transmission model, Doppler shifts, channel model depending on frequency and time, path loss model, mathematical model of radio channel, radio channel simulation methods, basic knowledge on radio communications including theory of radio channel propagation. Types of interference in radio communications, channel equalization methods, noise reduction methods, radio communication capacity, receiver structure, Common modulation methods for radio communications, 4G and 5G standards for radio communications.</td>
</tr>
<tr>
<td>Data &amp; Text Transmission (3)</td>
<td>This course provides students knowledge about basic of data transmission and their applications in Air Traffic Management, and applications in Air Traffic Management, Air Traffic Management, and applications in Air Traffic Management. Features and requirements of data communications, network architecture, data communication technologies, error detection and correction methods, channel coding, and data link application 4G and 5G.</td>
</tr>
<tr>
<td>Localization &amp; Electronic Navigation (3)</td>
<td>Introduction to the radar system, system architecture, operation and applications in Air Traffic Management, and applications in Air Traffic Management. Features and requirements of data communications, network architecture, data communication technologies, error detection and correction methods, channel coding, and data link application 4G and 5G.</td>
</tr>
<tr>
<td>Multimedia Production (2)</td>
<td>Process of multimedia content production, Methods and tools for creating and composing hypermedia authoring content, Environmental programming development. Tools: HyperWeb, JPanels, iText, HTML5, CSS2, JavaScript, Media Content Creation and Publishing, Multimedia networks: UDP, IPTV, HTPC, RTMP, RTSP, SSL.</td>
</tr>
</tbody>
</table>