

## University of Misan جامعة ميسان



*First Cycle – Four Levels – 240 ECTS*  
*Bachelor's Degree (B.Sc.) - Electrical Engineering*

الدورة الأولى - بكالوريوس هندسة كهربائية - أربع سنوات - ٢٤٠ وحدة ائتمانية



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### 1. Overview

This catalogue is about the courses (modules) given by the program of Electrical Engineering to gain the Bachelor of Science degree. The 4-year program delivers (40, as an example) Modules with (6000) total student workload hours and 240 total ECTS. The module delivery is based on the Bologna Process.

#### نظرة عامة

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج الهندسة الكهربائية للحصول على درجة بكالوريوس العلوم. يقدم برنامج الأربع سنوات (٤٠) مادة دراسية، على سبيل المثال، مع (٦٠٠٠) إجمالي ساعات حمل الطالب و ٢٤٠ إجمالي وحدات أوروبية. يعتمد تقديم المواد الدراسية على عملية بولونيا.

### 2. Undergraduate Modules 2025-2026

#### Module 1

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Module Title                             | ECTS          | Semester    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|---------------|-------------|
| EL111                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Fundamentals of Electrical Engineering I | 7             | 1           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | OLect/Lab./Prac./Tutor                   | SSWL (hr/sem) | USWL (hr/w) |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Lab 2 / Tut 1                            | 93            | 82          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                          |               |             |
| <p>This module introduces students to the foundational principles of electrical engineering, establishing the theoretical basis for subsequent specialized courses. Topics include electric charge, current, voltage, and resistance; Ohm's and Kirchhoff's laws; series, parallel, and mixed resistive circuits; network theorems such as Thevenin's, Norton's, and superposition; and basic techniques for nodal and mesh analysis. The module also covers capacitors and inductors, their governing equations, and an introduction to transient behavior in first-order RC and RL circuits. Laboratory sessions reinforce lecture material through hands-on construction and measurement of DC circuits using multimeters, breadboards, and power supplies. By the end of the module, students should be able to analyze and solve basic resistive and reactive circuit problems, apply fundamental circuit laws confidently, and interpret experimental measurements, preparing them for further study in circuit analysis, electronics, and power systems.</p> |                                          |               |             |

**Module 2**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Module Title           | ECTS          | Semester    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EE112                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Mathematics I          | 5             | 1           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Tut 1                  | 63            | 62          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                        |               |             |
| <p>This module provides the essential mathematical foundation required for engineering studies, focusing on differential and integral calculus of single-variable functions. Topics include limits and continuity; differentiation rules and applications such as rates of change, optimization, and curve sketching; techniques of integration including substitution, integration by parts, and partial fractions; definite integrals and their applications to area, volume, and work; and an introduction to infinite sequences and series. Complex numbers and elementary vector algebra are also introduced as tools used throughout the engineering curriculum. Emphasis is placed on developing analytical problem-solving skills and translating physical engineering problems into mathematical models. Tutorial sessions supplement lectures with guided practice on problem sets. On completion, students will be equipped with the calculus and algebraic tools necessary for subsequent modules in physics, circuit theory, and advanced mathematics.</p> |                        |               |             |

**Module 3**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Module Title           | ECTS          | Semester    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EE113                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Basic Physics          | 5             | 1           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Tut 1                  | 63            | 62          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                        |               |             |
| <p>This module covers core principles of classical mechanics and physical concepts that underpin electrical engineering practice. Topics include vectors and kinematics; Newton's laws of motion; work, energy, and power; momentum and collisions; rotational motion and torque; and an introduction to oscillations and simple harmonic motion. The module also introduces basic concepts of heat, temperature, and thermodynamics, as well as an overview of wave phenomena including sound and light. Emphasis is placed on the application of physical laws to quantitative problem solving and on building physical intuition that supports later study of electromagnetism and electrical systems. Tutorial sessions provide practice applying formulas to engineering-relevant scenarios. By the end of the module, students should be able to formulate and solve mechanics and basic thermodynamics problems and appreciate the physical basis of phenomena encountered in later specialized modules.</p> |                        |               |             |

**Module 4**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Module Title           | ECTS          | Semester    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| UM114                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Computer Programming   | 5             | 1           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Lab 2                  | 63            | 62          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        |               |             |
| <p>This module introduces students to the fundamentals of computer programming as a tool for engineering problem-solving. Topics include the structure of a computer program, variables, data types, operators, and expressions; control structures such as conditionals and loops; functions and modular program design; arrays and basic data structures; and an introduction to file input/output. Students learn to translate simple engineering and mathematical problems into algorithms and implement them in a structured programming language. Laboratory sessions provide hands-on practice writing, testing, and debugging programs, and introduce good coding practices such as commenting and structured problem decomposition. By the end of the module, students should be able to design simple algorithms, implement them correctly in code, and use basic debugging techniques, laying the groundwork for more advanced programming and computational modules later in the curriculum.</p> |                        |               |             |

**Module 5**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Module Title           | ECTS          | Semester    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EE123                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Chemistry              | 3             | 1           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Tut 1                  | 48            | 27          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                        |               |             |
| <p>This module introduces general chemistry concepts relevant to engineering practice. Topics include atomic structure and the periodic table; chemical bonding and molecular structure; stoichiometry and chemical equations; states of matter and gas laws; solutions and concentration units; acid-base chemistry; and an introduction to oxidation-reduction reactions and electrochemistry, with emphasis on topics relevant to electrical and materials applications such as corrosion and batteries. Basic thermochemistry concepts, including enthalpy and energy changes in reactions, are also covered. Laboratory sessions provide practical experience with basic chemical techniques, measurement, and safety procedures. By the end of the module, students should understand fundamental chemical principles and their relevance to material selection, corrosion protection, and energy storage devices encountered in electrical engineering practice.</p> |                        |               |             |

**Module 6**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Module Title           | ECTS          | Semester    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| UM116                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Academic English I     | 2             | 1           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | —                      | 33            | 17          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                        |               |             |
| <p>This module develops the English language skills required for academic and professional success in engineering studies. It focuses on the four core language skills: reading comprehension of technical and academic texts; academic writing, including paragraph and short essay structure, coherence, and clarity; listening comprehension; and oral communication, including presentations and discussions. Grammar and vocabulary development relevant to academic and technical contexts are integrated throughout. Students practice note-taking, summarizing, and paraphrasing academic material, as well as basic principles of academic integrity and citation. By the end of the module, students should be able to read and understand academic texts in their field, produce clear and well-organized written work, and communicate effectively in spoken English in academic and professional settings, forming a foundation for further academic English study.</p> |                        |               |             |

**Module 7**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Module Title           | ECTS          | Semester    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| ENG123                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Workshop Technology    | 3             | 1           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Lab 2                  | 48            | 27          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                        |               |             |
| <p>This module introduces students to fundamental workshop practices and manufacturing processes relevant to engineering. Topics include workshop safety procedures; hand tools and measuring instruments; basic bench work such as filing, cutting, and fitting; fundamentals of machining processes including drilling, turning, and milling; basic sheet metal work; and an introduction to joining processes such as soldering and welding. Students gain practical experience interpreting simple engineering drawings and applying them to produce basic components. Emphasis is placed on developing manual dexterity, precision, and an appreciation of manufacturing tolerances and quality. By the end of the module, students should be able to safely operate common workshop tools and machines, execute basic fabrication tasks, and understand practical considerations involved in manufacturing simple engineering components, supporting later design and laboratory-based modules.</p> |                        |               |             |

**Module 8**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Module Title                              | ECTS          | Semester    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|---------------|-------------|
| EL121                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Fundamentals of Electrical Engineering II | 6             | 2           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | OLect/Lab./Prac./Tutor                    | SSWL (hr/sem) | USWL (hr/w) |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Lab 2 / Tut 1                             | 93            | 57          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                           |               |             |
| <p>Building on Fundamentals of Electrical Engineering I, this module extends circuit theory to alternating current (AC) systems. Topics include sinusoidal signals and phasor representation; impedance and admittance of resistive, inductive, and capacitive elements; AC circuit analysis using phasor methods; power in AC circuits including real, reactive, and apparent power and power factor; series and parallel resonance; and an introduction to three-phase circuits. Magnetic circuits and mutual inductance are also introduced as a basis for later study of transformers and machines. Laboratory sessions allow students to measure AC quantities, verify theoretical calculations, and observe resonance phenomena using oscilloscopes and function generators. By the end of the module, students should be able to analyze AC circuits confidently, compute power quantities, and understand resonance and magnetic coupling, preparing them for further study of electrical machines and power systems.</p> |                                           |               |             |

**Module 9**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Module Title           | ECTS          | Semester    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EE122                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Mathematics II         | 5             | 2           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Tut 1                  | 63            | 62          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                        |               |             |
| <p>This module continues the mathematical development begun in Mathematics I, with emphasis on topics of direct relevance to electrical engineering. Topics include ordinary differential equations of first and second order and their solution methods; applications of differential equations to circuit and system modeling; matrices and determinants; systems of linear equations and their solution using matrix methods; introductory vector calculus including partial derivatives and multiple integrals; and an introduction to Laplace transforms. Emphasis is placed on connecting mathematical techniques to engineering applications such as circuit transients and system response. Tutorial sessions provide guided problem-solving practice. By the end of the module, students should be able to solve linear differential equations, perform matrix operations, and apply these mathematical tools to model and analyze engineering systems encountered in subsequent circuit and control-related modules.</p> |                        |               |             |

**Module 10**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Module Title           | ECTS          | Semester    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EE123                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Electronic I           | 5             | 2           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Tut 1                  | 63            | 62          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                        |               |             |
| <p>This module introduces the fundamentals of electronic devices and their applications in analog circuits. Topics include semiconductor physics basics; diode characteristics and applications such as rectification, clipping, and clamping circuits; bipolar junction transistor (BJT) structure, operation, and biasing; small-signal amplifier analysis; and an introduction to field-effect transistors. Frequency response and basic amplifier configurations are also covered. Laboratory sessions give students practical experience constructing and testing diode and transistor circuits, measuring characteristic curves, and analyzing amplifier performance using standard laboratory instruments. By the end of the module, students should be able to analyze and design basic diode and transistor circuits, understand device characteristics, and apply this knowledge to simple amplifier design, forming the foundation for further study in electronics and analog circuit design.</p> |                        |               |             |

**Module 11**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Module Title            | ECTS          | Semester    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------|-------------|
| EL124                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Computer Programming II | 4             | 2           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | OLect/Lab./Prac./Tutor  | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Lab 2                   | 63            | 37          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                         |               |             |
| <p>This module builds on Computer Programming to develop more advanced programming concepts and their application to engineering problems. Topics include structured and modular programming in greater depth; pointers and dynamic memory management; multidimensional arrays and structures; recursive algorithms; file handling and data persistence; and an introduction to numerical methods such as root-finding and simple matrix operations implemented in code. Students apply programming skills to solve engineering computation problems, reinforcing links between mathematics, physics, and software implementation. Laboratory sessions emphasize independent problem-solving, debugging, and structured program design. By the end of the module, students should be able to design and implement more complex programs, apply basic numerical techniques computationally, and use programming as a practical tool for engineering analysis, preparing them for computational modules later in the curriculum.</p> |                         |               |             |

**Module 12**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Module Title           | ECTS          | Semester    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EE125                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Mechanical Engineering | 2             | 2           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | —                      | 33            | 17          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                        |               |             |
| <p>This module introduces electrical engineering students to fundamental concepts of mechanical engineering relevant to their discipline. Topics include statics, covering forces, moments, and equilibrium of rigid bodies; an overview of stress and strain and mechanical properties of materials; basic concepts of machine elements such as gears, bearings, and shafts; and an introduction to thermodynamics and energy conversion principles relevant to power generation systems. The module aims to give students sufficient mechanical background to understand the mechanical aspects of electromechanical systems, such as motors, generators, and turbines, that they will encounter in later specialized modules. By the end of the module, students should be able to analyze simple static systems, understand basic material behavior under load, and appreciate the mechanical principles underlying electromechanical energy conversion devices.</p> |                        |               |             |

**Module 13**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Module Title           | ECTS          | Semester    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EE115                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Engineering Drawing    | 4             | 2           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Lab 2                  | 48            | 52          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                        |               |             |
| <p>This module develops students' ability to create and interpret technical engineering drawings, a core communication skill in engineering practice. Topics include drawing standards and conventions; orthographic projection and multi-view drawing; dimensioning and tolerancing; sectional views; isometric and pictorial drawing; and an introduction to computer-aided design (CAD) tools for producing and editing technical drawings. Students practice translating three-dimensional objects into accurate two-dimensional representations and vice versa. Laboratory sessions provide hands-on practice with both manual drafting techniques and CAD software. By the end of the module, students should be able to produce clear, accurate, and standard-compliant engineering drawings, interpret drawings produced by others, and use basic CAD tools, supporting their ability to communicate technical designs throughout the engineering curriculum and professional practice.</p> |                        |               |             |



**Module 14**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Module Title               | ECTS          | Semester    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------------|-------------|
| UM126                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Democracy and Human Rights | 2             | 2           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | OLect/Lab./Prac./Tutor     | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | —                          | 33            | 17          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                            |               |             |
| <p>This module introduces students to the fundamental concepts of democracy, citizenship, and human rights, situating them within both international frameworks and the national context. Topics include the historical development of democratic governance; principles of political participation and civil liberties; the structure and function of democratic institutions; international human rights instruments and their enforcement mechanisms; and contemporary issues relating to equality, freedom of expression, and the rule of law. Discussion-based sessions encourage students to critically analyze case studies and apply democratic and human rights principles to real-world situations. By the end of the module, students should understand the foundations of democratic governance and human rights, appreciate their civic responsibilities, and be able to engage thoughtfully with contemporary social and political issues as informed citizens.</p> |                            |               |             |

**Module 15**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Module Title           | ECTS          | Semester    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| UM123                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Arabic Language I      | 2             | 2           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | —                      | 33            | 17          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                        |               |             |
| <p>This module develops students' proficiency in the Arabic language, with emphasis on formal and academic usage. Topics include grammar (nahw) and morphology (sarf) fundamentals; reading comprehension of literary and expository texts; vocabulary development; and writing skills, including composition and correct expression in Modern Standard Arabic. Listening and speaking activities reinforce correct pronunciation and formal oral expression. The module also introduces students to selected examples of Arabic literary and cultural texts to strengthen appreciation of the language's structure and heritage. By the end of the module, students should be able to read and comprehend formal Arabic texts accurately, write grammatically correct compositions, and communicate effectively in formal spoken Arabic, supporting their broader academic and professional communication skills.</p> |                        |               |             |

**Module 16**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Module Title           | ECTS          | Semester    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL211                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Electrical Circuit I   | 4             | 3           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Tut 1                  | 63            | 37          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                        |               |             |
| <p>This module extends circuit analysis to more advanced techniques required for electrical engineering practice. Topics include mesh and nodal analysis for complex networks, Thevenin and Norton equivalent circuits, maximum power transfer, two-port network parameters, and an introduction to frequency-domain analysis using the Laplace transform. Transient response of RLC circuits and step responses of first- and second-order systems are studied in depth. Laboratory sessions allow students to construct and measure transient and steady-state circuit behavior using oscilloscopes and signal generators. By the end of the module, students should be able to apply advanced network analysis techniques, compute transient and frequency responses of linear circuits, and interpret laboratory measurements, forming the analytical basis for subsequent courses in machines, power systems, and control.</p> |                        |               |             |

**Module 17**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Module Title           | ECTS          | Semester    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL212                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Electrical Machine I   | 4             | 3           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Tut 1                  | 63            | 37          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                        |               |             |
| <p>This module introduces the principles of electromechanical energy conversion and the operation of transformers and DC machines. Topics include magnetic circuits and core losses; transformer construction, equivalent circuit, and efficiency; DC machine construction, generator and motor characteristics; and starting and speed control methods for DC motors. Emphasis is placed on understanding the electromagnetic principles that govern energy conversion devices and on performing standard performance tests. Laboratory sessions provide hands-on experience testing transformers and DC machines and measuring their characteristic curves. By the end of the module, students should be able to analyze transformer and DC machine performance, interpret test results, and apply this understanding to subsequent modules covering AC machines and power systems.</p> |                        |               |             |

**Module 18**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Module Title           | ECTS          | Semester    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| ENG201                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Mathematics III        | 4             | 3           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Tut 1                  | 63            | 37          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                        |               |             |
| <p>This module develops mathematical techniques of particular relevance to electrical engineering analysis. Topics include Fourier series and their application to periodic signals; an introduction to Fourier transforms; complex analysis fundamentals including complex functions and contour integration basics; partial differential equations relevant to field problems; and further techniques in Laplace transforms including inverse transforms and their use in solving circuit and system equations. Emphasis is placed on connecting these mathematical tools to signal analysis, circuit transients, and electromagnetic field problems encountered in later modules. Tutorial sessions reinforce problem-solving skills through guided practice. By the end of the module, students should be able to apply Fourier and Laplace techniques and complex analysis methods to engineering problems in circuits, signals, and systems.</p> |                        |               |             |

**Module 19**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Module Title           | ECTS          | Semester    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL213                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Electronics II         | 5             | 3           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Lab 2                  | 63            | 62          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                        |               |             |
| <p>This module builds on introductory electronics to cover operational amplifiers and multistage amplifier design. Topics include operational amplifier characteristics and ideal op-amp analysis; common op-amp circuit configurations such as inverting, non-inverting, summing, and differential amplifiers; active filters; multistage and differential amplifier analysis; and an introduction to feedback in amplifier circuits. Frequency response and gain-bandwidth considerations are also discussed. Laboratory sessions give students practical experience building and testing op-amp circuits and active filters using standard laboratory instruments. By the end of the module, students should be able to analyze and design op-amp based circuits and basic active filters, and understand feedback effects on amplifier performance, supporting further study in analog and digital electronic design.</p> |                        |               |             |

**Module 20**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Module Title             | ECTS          | Semester    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|---------------|-------------|
| EL214                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Electromagnetic Fields I | 3             | 3           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | OLect/Lab./Prac./Tutor   | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Tut 1                    | 48            | 27          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                          |               |             |
| <p>This module introduces the fundamentals of electromagnetic field theory. Topics include vector calculus tools relevant to fields (gradient, divergence, curl); electrostatics, including Coulomb's law, Gauss's law, and electric potential; capacitance and energy in electric fields; steady electric currents and boundary conditions; and an introduction to magnetostatics, including the Biot-Savart law and Ampere's law. Emphasis is placed on developing the mathematical and conceptual tools needed to analyze static electric and magnetic fields relevant to electrical engineering applications such as capacitors, transmission lines, and magnetic devices. Tutorial sessions reinforce problem-solving using vector field techniques. By the end of the module, students should be able to solve fundamental electrostatic and magnetostatic problems and apply field theory concepts to practical engineering situations.</p> |                          |               |             |

**Module 21**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Module Title             | ECTS          | Semester    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|---------------|-------------|
| EL215                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Computer Programming III | 4             | 3           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | OLect/Lab./Prac./Tutor   | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Lab 2                    | 63            | 37          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                          |               |             |
| <p>This module develops object-oriented programming concepts and their application to engineering software development. Topics include classes and objects, encapsulation, inheritance, and polymorphism; exception handling; an introduction to standard libraries and data structures such as lists, stacks, and queues; and basic software design principles. Students apply object-oriented techniques to model engineering problems and build modular, reusable code. Laboratory sessions emphasize practical software development, testing, and debugging within an object-oriented framework. By the end of the module, students should be able to design and implement object-oriented programs, apply appropriate data structures to engineering problems, and appreciate principles of good software design, building on procedural programming skills developed in earlier modules.</p> |                          |               |             |

**Module 22**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Module Title           | ECTS          | Semester    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL216                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Digital Techniques I   | 4             | 3           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Lab 2                  | 63            | 37          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                        |               |             |
| <p>This module introduces the fundamentals of digital logic design. Topics include number systems and codes; Boolean algebra and logic gates; combinational logic design techniques including Karnaugh maps; standard combinational circuits such as adders, multiplexers, decoders, and encoders; and an introduction to sequential logic concepts including latches and flip-flops. Laboratory sessions provide hands-on experience designing, building, and testing digital logic circuits using logic gates and basic digital ICs, as well as simulation tools. By the end of the module, students should be able to design and simplify combinational logic circuits, understand the operation of basic sequential elements, and construct and test digital circuits, forming the foundation for further study in digital systems and computer architecture.</p> |                        |               |             |

**Module 23**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Module Title           | ECTS          | Semester    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| UM202                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Academic English II    | 2             | 3           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | —                      | 33            | 17          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                        |               |             |
| <p>This module builds on Academic English I to further develop the language proficiency required for advanced academic and professional engineering communication. Topics include advanced academic reading strategies for technical literature; report and technical writing, including structure, clarity, and appropriate register; advanced listening and note-taking skills; and oral presentation skills for technical topics. Students practice summarizing and critically engaging with academic and technical sources, as well as further developing academic vocabulary and citation practices. By the end of the module, students should be able to read and critically engage with technical academic literature, produce well-structured technical reports, and deliver clear oral presentations, preparing them for the demands of upper-level engineering study and professional practice.</p> |                        |               |             |

**Module 24**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Module Title           | ECTS          | Semester    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL221                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Electrical Circuit II  | 4             | 4           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Tut 1                  | 63            | 37          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                        |               |             |
| <p>This module extends circuit theory to advanced topics required for further study in electrical engineering. Topics include two-port network analysis; frequency response and Bode plots; filter design fundamentals; state-variable representation of circuits; and further applications of Laplace transform methods to circuit transient analysis. Coupled circuits and their analysis are also introduced. Laboratory sessions allow students to measure frequency response characteristics and verify theoretical filter designs. By the end of the module, students should be able to analyze two-port networks, interpret and construct frequency response plots, design basic passive filters, and apply state-variable and transform methods to circuit problems, supporting subsequent study in machines, communications, and control systems.</p> |                        |               |             |

**Module 25**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Module Title           | ECTS          | Semester    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL222                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Electrical Machine II  | 5             | 4           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Lab 2 / Tut 1          | 78            | 47          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                        |               |             |
| <p>This module covers the principles and operation of AC electrical machines. Topics include the construction and operating principles of induction motors; synchronous machines including generators and motors; equivalent circuit models and performance characteristics; starting methods and speed control of AC machines; and an introduction to machine testing procedures. Laboratory sessions provide hands-on experience testing induction and synchronous machines and interpreting their performance characteristics. By the end of the module, students should be able to analyze the operation and performance of AC machines, interpret test data, and understand starting and control methods, building directly on the DC machine and transformer principles introduced in Electrical Machine I.</p> |                        |               |             |

**Module 26**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Module Title           | ECTS          | Semester    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| ENG202                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Mathematics IV         | 4             | 4           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Tut 1                  | 63            | 37          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                        |               |             |
| <p>This module continues the mathematical development of the curriculum with topics of advanced relevance to electrical engineering. Building on earlier calculus, differential equations, and transform methods, topics include systems of differential equations and their matrix solution methods; further applications of Fourier and Laplace transforms to system analysis; an introduction to probability and random variables relevant to signal and communication systems; and numerical solution techniques for engineering equations. Emphasis is placed on connecting mathematical methods to system modeling and analysis problems encountered in subsequent modules. Tutorial sessions provide guided practice applying these techniques. By the end of the module, students should be able to apply advanced mathematical methods to model and analyze engineering systems relevant to control, communications, and signal processing.</p> |                        |               |             |

**Module 27**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Module Title           | ECTS          | Semester    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL223                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Electronics III        | 4             | 4           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Lab 2                  | 63            | 37          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                        |               |             |
| <p>This module covers the fundamentals of digital and power electronics building on earlier analog electronics study. Topics include transistor switching characteristics; basic power electronic devices such as thyristors and power MOSFETs; rectifier and converter circuit fundamentals; and an introduction to oscillator and waveform generation circuits. Multistage amplifier design and frequency response considerations relevant to practical circuit design are also covered. Laboratory sessions provide practical experience building and testing switching and power circuits. By the end of the module, students should be able to analyze transistor switching behavior, understand basic power electronic conversion circuits, and design simple oscillator circuits, extending their electronics knowledge toward power electronics and communication applications studied in later modules.</p> |                        |               |             |

**Module 28**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Module Title              | ECTS          | Semester    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|---------------|-------------|
| EL224                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Electromagnetic Fields II | 3             | 4           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | OLect/Lab./Prac./Tutor    | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Tut 1                     | 48            | 27          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                           |               |             |
| <p>This module builds on Electromagnetic Fields I to cover time-varying fields and wave propagation fundamentals. Topics include Faraday's law and electromagnetic induction; Maxwell's equations in integral and differential form; the wave equation and plane electromagnetic waves; boundary conditions at material interfaces; and an introduction to transmission line theory. Emphasis is placed on connecting field theory to practical applications such as inductors, transmission lines, and antennas. Tutorial sessions reinforce problem-solving using Maxwell's equations and wave concepts. By the end of the module, students should be able to apply Maxwell's equations to time-varying field problems, analyze basic wave propagation phenomena, and understand the electromagnetic basis of transmission lines and antennas studied in later communication modules.</p> |                           |               |             |

**Module 29**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Module Title            | ECTS          | Semester    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------|-------------|
| EL215                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Computer Programming IV | 4             | 4           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | OLect/Lab./Prac./Tutor  | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Lab 2                   | 63            | 37          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                         |               |             |
| <p>This module extends object-oriented programming concepts toward more advanced software engineering practices relevant to electrical engineering applications. Topics include advanced data structures such as trees and graphs; algorithm design and complexity considerations; an introduction to graphical user interface (GUI) development; interfacing software with hardware and basic data acquisition concepts; and further practice in structured software project development. Students apply these skills to build more substantial engineering-oriented software projects. Laboratory sessions emphasize independent project work, debugging, and collaborative development practices. By the end of the module, students should be able to design and implement more advanced software applications, apply appropriate data structures and algorithms, and understand basic principles of software-hardware interfacing relevant to engineering applications.</p> |                         |               |             |



**Module 30**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Module Title           | ECTS          | Semester    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL226                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Digital Techniques II  | 2             | 4           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | —                      | 33            | 17          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                        |               |             |
| <p>This module builds on Digital Techniques I to cover sequential logic design and introductory digital systems. Topics include flip-flops and their characteristic equations; design of synchronous sequential circuits such as counters and registers; state machine design using state diagrams and state tables; memory devices and basic programmable logic concepts; and an introduction to hardware description languages for digital design. Laboratory sessions provide hands-on experience designing and testing sequential circuits and simple digital systems, including simulation-based design verification. By the end of the module, students should be able to design synchronous sequential circuits, develop state machines from specifications, and apply basic hardware description language concepts, preparing them for further study in computer architecture and digital systems.</p> |                        |               |             |

**Module 31**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Module Title           | ECTS          | Semester    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| UM203                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Arabic Language II     | 2             | 4           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | —                      | 33            | 17          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                        |               |             |
| <p>This module builds on Arabic Language I to further develop students' proficiency in formal Arabic. Topics include advanced grammar and morphology; reading and critical analysis of more complex literary and academic texts; advanced composition and essay writing in Modern Standard Arabic; and refinement of oral expression and presentation skills. Students engage with selected texts to deepen their appreciation of Arabic linguistic structure, rhetoric, and cultural heritage. By the end of the module, students should be able to read and critically analyze advanced Arabic texts, produce well-structured and grammatically correct written compositions, and communicate effectively and fluently in formal spoken Arabic, further strengthening the language competencies developed in Arabic Language I.</p> |                        |               |             |

**Module 32**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Module Title                   | ECTS          | Semester    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|---------------|-------------|
| MNS120                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Crimes of the Ba'athist Regime | 2             | 4           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | OLect/Lab./Prac./Tutor         | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | —                              | 33            | 17          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                |               |             |
| <p>This module examines the historical record of human rights violations and political repression committed under the Ba'athist regime in Iraq, situating this history within the broader study of governance, accountability, and human rights. Topics include the political and social context of the period; documented cases of political persecution, forced displacement, and mass violence; the role of transitional justice mechanisms in addressing past abuses; and the relevance of this history to contemporary civic values and the rule of law. Discussion-based sessions encourage critical reflection on the lessons of this period for present-day governance and citizenship. By the end of the module, students should understand this period of national history and appreciate its significance for civic responsibility, human rights, and democratic accountability.</p> |                                |               |             |

**Module 33**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Module Title           | ECTS          | Semester    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL311                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Electrical Machines I  | 5             | 5           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Lab 2 / Tut 1          | 78            | 47          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                        |               |             |
| <p>This module provides an applied, in-depth treatment of electrical machine performance building on the transformer and DC/AC machine fundamentals introduced earlier. Topics include steady-state equivalent circuit analysis of transformers and induction machines under varying load conditions; per-unit systems for machine analysis; machine efficiency and losses; parallel operation of transformers; and an introduction to machine selection criteria for industrial applications. Laboratory sessions involve performance testing of transformers and induction machines under controlled loading conditions. By the end of the module, students should be able to perform detailed steady-state performance analysis of electrical machines, apply per-unit calculations, and evaluate machine suitability for given applications, supporting subsequent modules in electrical power and specialized machines.</p> |                        |               |             |

**Module 34**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Module Title           | ECTS          | Semester    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL312                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Electrical Power I     | 4             | 5           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Tut 1                  | 63            | 37          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                        |               |             |
| <p>This module introduces the fundamentals of electrical power systems. Topics include the structure of power generation, transmission, and distribution systems; per-unit representation of power system quantities; transmission line parameters and modeling; power flow concepts in simple networks; and an introduction to load characteristics and power system economics. Basic protection and safety concepts relevant to power systems are also introduced. Tutorial sessions reinforce problem-solving related to per-unit calculations and transmission line analysis. By the end of the module, students should be able to model simple transmission lines, perform per-unit calculations, and understand the basic structure and operation of electrical power systems, forming the foundation for further study in power system analysis and protection.</p> |                        |               |             |

**Module 35**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Module Title           | ECTS          | Semester    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL313                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Communication I        | 4             | 5           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Tut 1                  | 63            | 37          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        |               |             |
| <p>This module introduces the fundamentals of analog communication systems. Topics include signal representation in time and frequency domains; amplitude modulation (AM) and its variants; frequency and phase modulation (FM/PM); modulator and demodulator circuit principles; noise in communication systems; and an introduction to basic communication system performance metrics such as signal-to-noise ratio. Laboratory sessions provide practical experience building and testing modulation and demodulation circuits and observing signal spectra using laboratory instruments. By the end of the module, students should be able to analyze and compare analog modulation techniques, understand the effects of noise on communication performance, and apply basic principles of communication system design, preparing them for further study in digital communications.</p> |                        |               |             |

**Module 36**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Module Title           | ECTS          | Semester    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL314                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Engineering Analysis   | 4             | 5           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | —                      | 48            | 52          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                        |               |             |
| <p>This module develops advanced mathematical and analytical methods used in electrical engineering system analysis. Topics include matrix methods for engineering systems; optimization techniques relevant to engineering design problems; numerical methods for solving engineering equations; introductory probability and statistics for engineering data analysis; and techniques for modeling and analyzing linear engineering systems. Emphasis is placed on applying these analytical tools to realistic engineering problems drawn from circuits, systems, and power applications. Tutorial sessions provide guided practice in applying these methods. By the end of the module, students should be able to apply advanced analytical and numerical techniques to formulate and solve engineering problems, strengthening the quantitative foundation required for design and analysis in subsequent specialized modules.</p> |                        |               |             |

**Module 37**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Module Title           | ECTS          | Semester    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL315                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Electronics IV         | 4             | 5           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Lab 2                  | 63            | 37          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                        |               |             |
| <p>This module covers advanced analog and mixed-signal electronic circuits. Topics include multistage amplifier design and analysis; frequency response and stability in feedback amplifiers; oscillator circuit design; introductory analog-to-digital and digital-to-analog conversion principles; and power amplifier fundamentals. Emphasis is placed on practical circuit design considerations and performance trade-offs. Laboratory sessions provide hands-on experience designing, building, and testing multistage and feedback amplifier circuits. By the end of the module, students should be able to design and analyze advanced amplifier and oscillator circuits, understand basic data conversion principles, and evaluate circuit performance trade-offs, extending the analog electronics foundation built in earlier electronics modules toward more specialized applications.</p> |                        |               |             |

**Module 38**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Module Title           | ECTS          | Semester    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL316                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Control I              | 4             | 5           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Lab 2 / Tut 1          | 78            | 22          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        |               |             |
| <p>This module introduces the fundamentals of classical control systems. Topics include mathematical modeling of dynamic systems using differential equations and transfer functions; block diagram reduction and signal flow graphs; time-domain response analysis of first- and second-order systems; stability analysis using the Routh-Hurwitz criterion; and an introduction to root locus techniques. Laboratory sessions allow students to model simple systems and observe their time-domain response using simulation and laboratory hardware. By the end of the module, students should be able to develop transfer function models of simple dynamic systems, analyze system stability and time-domain response, and apply basic classical control analysis techniques, forming the foundation for further study in advanced control systems.</p> |                        |               |             |

**Module 39**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Module Title           | ECTS          | Semester    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL317                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Wave Propagation       | 2             | 5           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | —                      | 33            | 17          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                        |               |             |
| <p>This module covers the fundamentals of electromagnetic wave propagation relevant to communication and power applications. Topics include plane wave propagation in free space and lossy media; reflection and transmission of waves at boundaries; wave polarization; propagation over the earth and in the atmosphere, including ground wave and sky wave mechanisms; and an introduction to propagation considerations relevant to radio and microwave communication links. Emphasis is placed on connecting theoretical wave concepts to practical link design considerations. By the end of the module, students should be able to analyze basic wave propagation problems, understand the effects of different propagation media and mechanisms, and apply this understanding to the design considerations of communication systems studied in later modules.</p> |                        |               |             |

**Module 40**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Module Title           | ECTS          | Semester    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL318                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Computer Architecture  | 3             | 5           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Tut 1                  | 48            | 27          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                        |               |             |
| <p>This module introduces the fundamental organization and operation of digital computer systems. Topics include the von Neumann architecture; central processing unit organization, including the arithmetic logic unit, registers, and control unit; instruction sets and instruction cycle execution; memory hierarchy and addressing modes; and an introduction to input/output organization and basic bus structures. Tutorial exercises reinforce understanding through simple assembly-level programming or simulation of processor operation. By the end of the module, students should be able to describe the organization and operation of a basic computer system, understand instruction execution and memory addressing, and appreciate the hardware principles underlying computer systems used in embedded and general-purpose computing applications.</p> |                        |               |             |

**Module 41**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Module Title           | ECTS          | Semester    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL321                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Electrical Machines II | 5             | 6           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Lab 2 / Tut 1          | 78            | 47          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                        |               |             |
| <p>This module extends the study of electrical machines to cover dynamic behavior and specialized operating conditions. Topics include transient behavior of induction and synchronous machines; machine control considerations including variable-speed operation; efficiency optimization and thermal considerations; parallel operation of synchronous generators; and machine selection and application in industrial settings. Laboratory sessions include performance testing under dynamic or variable loading conditions. By the end of the module, students should be able to analyze the dynamic performance of electrical machines, understand principles of machine control and parallel operation, and apply this knowledge to practical industrial machine applications, building on the steady-state analysis developed in earlier machines modules.</p> |                        |               |             |

**Module 42**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Module Title           | ECTS          | Semester    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL322                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Electrical Power II    | 5             | 6           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Tut 1                  | 63            | 62          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                        |               |             |
| <p>This module builds on Electrical Power I to cover more advanced power system analysis techniques. Topics include power flow analysis methods for interconnected networks; fault analysis and short-circuit calculations; symmetrical components for unbalanced fault analysis; an introduction to power system stability concepts; and basic principles of power system protection. Tutorial and computational exercises reinforce power flow and fault calculation techniques. By the end of the module, students should be able to perform power flow and fault analysis for simple power networks, apply symmetrical component methods to unbalanced conditions, and understand the basic principles underlying power system stability and protection, preparing them for further specialized study in power systems.</p> |                        |               |             |

**Module 43**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Module Title           | ECTS          | Semester    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL323                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Communication II       | 5             | 6           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Lab 2 / Tut 1          | 78            | 47          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                        |               |             |
| <p>This module builds on Communication I to introduce digital communication principles. Topics include sampling theory and pulse code modulation; digital baseband transmission techniques; line coding schemes; digital modulation techniques such as ASK, FSK, and PSK; and an introduction to channel capacity and basic error performance concepts. Laboratory sessions provide practical experience with sampling, digital modulation, and demodulation circuits or simulation tools. By the end of the module, students should be able to analyze sampling and digital modulation systems, compare digital modulation schemes, and understand fundamental limits on communication channel performance, extending the analog communication foundation toward the digital communication systems studied in later specialized modules.</p> |                        |               |             |

**Module 44**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Module Title           | ECTS          | Semester    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL324                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Numerical Analysis     | 3             | 6           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Tut 1                  | 48            | 27          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                        |               |             |
| <p>This module introduces numerical methods for solving engineering problems that lack closed-form analytical solutions. Topics include numerical solution of nonlinear equations; numerical differentiation and integration; numerical solution of ordinary differential equations; matrix methods for solving systems of linear equations; and an introduction to curve fitting and interpolation techniques. Emphasis is placed on implementing these methods computationally and understanding their accuracy and limitations. Tutorial sessions provide practice implementing numerical algorithms, often using programming tools developed in earlier modules. By the end of the module, students should be able to select and apply appropriate numerical methods to solve engineering problems computationally, supporting analysis tasks encountered throughout power systems, control, and other specialized engineering modules.</p> |                        |               |             |

**Module 45**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Module Title           | ECTS          | Semester    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL325                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Electronics V          | 3             | 6           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Tut 1                  | 48            | 27          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                        |               |             |
| <p>This module covers specialized and advanced electronic circuit topics building on prior electronics study. Topics include integrated circuit amplifier design considerations; differential and operational transconductance amplifiers; active filter design techniques; voltage regulators and basic power supply circuits; and an introduction to mixed-signal circuit considerations. Emphasis is placed on practical design trade-offs relevant to integrated and discrete circuit implementation. Laboratory sessions provide hands-on design, construction, and testing of specialized analog circuits. By the end of the module, students should be able to design and analyze specialized analog circuits including filters and regulators, understand integrated circuit design considerations, and apply this knowledge to practical circuit design problems encountered in electronic system design.</p> |                        |               |             |



**Module 46**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Module Title           | ECTS          | Semester    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL326                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Control II             | 3             | 6           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Tut 1                  | 48            | 27          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                        |               |             |
| <p>This module builds on Control I to cover frequency-domain and state-space methods in control system analysis and design. Topics include frequency response analysis using Bode and Nyquist plots; stability analysis using frequency-domain criteria; basic controller design techniques such as PID control; an introduction to state-space representation of dynamic systems; and basic concepts of system performance specifications. Simulation-based sessions allow students to design and evaluate simple feedback controllers. By the end of the module, students should be able to analyze systems in the frequency domain, design basic feedback controllers to meet performance specifications, and apply state-space concepts to system representation, extending the classical control foundation established in Control I.</p> |                        |               |             |

**Module 47**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Module Title           | ECTS          | Semester    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL327                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Antennas               | 2             | 6           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | —                      | 33            | 17          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                        |               |             |
| <p>This module introduces the fundamentals of antenna theory and design. Topics include basic antenna parameters such as radiation pattern, gain, directivity, and impedance; the theory and characteristics of dipole and monopole antennas; antenna arrays and beamforming concepts; and an introduction to practical antenna types used in communication systems. Emphasis is placed on connecting electromagnetic wave theory to practical antenna design and performance evaluation. Simulation-based exercises allow students to analyze basic antenna characteristics using measurement or simulation tools. By the end of the module, students should be able to describe fundamental antenna parameters, analyze the radiation characteristics of basic antenna types, and understand the role of antennas in communication system design.</p> |                        |               |             |

**Module 48**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Module Title           | ECTS          | Semester    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL328                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Computer Networks      | 4             | 6           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Lab 2                  | 63            | 37          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                        |               |             |
| <p>This module introduces the fundamental principles of computer networking. Topics include network architectures and the layered reference models (OSI and TCP/IP); data link layer concepts including framing and error control; network layer concepts including addressing and routing; transport layer protocols and their role in reliable communication; and an introduction to network performance and basic network security concepts. Laboratory sessions provide hands-on experience with network configuration, protocol analysis, and basic network simulation tools. By the end of the module, students should be able to describe the function of each networking layer, understand basic routing and addressing concepts, and analyze simple network configurations, supporting further study in communication systems and networked applications.</p> |                        |               |             |

**Module 49**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Module Title            | ECTS          | Semester    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------|-------------|
| EL411                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Power System Analysis I | 4             | 7           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | OLect/Lab./Prac./Tutor  | SSWL (hr/sem) | USWL (hr/w) |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Tut 1                   | 63            | 37          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                         |               |             |
| <p>This module provides a comprehensive treatment of power system modeling and analysis techniques. Topics include per-unit system representation of complete power networks; formulation and solution of the power flow problem using numerical methods such as Gauss-Seidel and Newton-Raphson; economic dispatch fundamentals; and an introduction to power system state estimation concepts. Computational exercises reinforce the application of numerical power flow techniques to representative networks. By the end of the module, students should be able to formulate and solve power flow problems for interconnected networks, apply per-unit modeling to complete systems, and understand basic economic operation concepts, building directly on the fundamentals introduced in Electrical Power I and II.</p> |                         |               |             |

**Module 50**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Module Title           | ECTS          | Semester    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL412                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Power Electronics      | 5             | 7           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Lab 2 / Tut 1          | 78            | 47          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                        |               |             |
| <p>This module introduces the principles and applications of power electronic conversion. Topics include power semiconductor devices such as diodes, thyristors, and power transistors; AC-DC rectifier circuits; DC-DC converter topologies; DC-AC inverter fundamentals; and an introduction to power electronic applications in motor drives and renewable energy systems. Laboratory sessions provide practical experience building and testing basic power conversion circuits and measuring their performance characteristics. By the end of the module, students should be able to analyze and design basic power electronic converter circuits, understand the operating principles of power semiconductor devices, and appreciate the role of power electronics in modern electrical power and drive systems.</p> |                        |               |             |

**Module 51**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Module Title           | ECTS          | Semester    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL413                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Information Theory     | 5             | 7           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Lab 2 / Tut 1          | 78            | 47          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                        |               |             |
| <p>This module introduces the mathematical foundations of information theory and their application to communication systems. Topics include measures of information and entropy; source coding and data compression fundamentals; channel capacity and the Shannon capacity theorem; an introduction to error control coding concepts; and the relationship between information theory and practical digital communication system design. Tutorial exercises reinforce the application of entropy and capacity calculations to representative communication scenarios. By the end of the module, students should be able to compute basic information-theoretic quantities, understand the fundamental limits on reliable communication imposed by channel capacity, and appreciate the theoretical basis for source and channel coding techniques used in digital communication systems.</p> |                        |               |             |

**Module 52**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Module Title            | ECTS          | Semester    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------|-------------|
| EL414                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Engineering Control III | 5             | 7           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | OLect/Lab./Prac./Tutor  | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Lab 2 / Tut 1           | 78            | 47          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                         |               |             |
| <p>This module covers advanced topics in control system design building on the classical and state-space methods introduced in earlier control modules. Topics include advanced state-space design techniques such as pole placement; observer design for state estimation; an introduction to digital control system concepts; robustness considerations in controller design; and practical implementation considerations for control systems. Simulation-based sessions allow students to design and evaluate more advanced control strategies on representative systems. By the end of the module, students should be able to apply advanced state-space design techniques, design basic state observers, and understand key considerations in the practical implementation of control systems, extending the foundation established in Control I and II.</p> |                         |               |             |

**Module 53**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Module Title           | ECTS          | Semester    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL415                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Advanced Electronics I | 4             | 7           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Tut 1                  | 48            | 52          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                        |               |             |
| <p>This module covers advanced topics in analog and digital electronic systems relevant to specialized engineering applications. Topics include advanced amplifier and signal conditioning circuit design; introductory analog-to-digital and digital-to-analog converter architectures; noise and distortion considerations in electronic circuits; and an introduction to mixed-signal system design considerations. Emphasis is placed on integrating analog and digital circuit knowledge for practical system-level design. Laboratory sessions provide hands-on design and testing of advanced electronic circuits. By the end of the module, students should be able to design and analyze advanced analog and mixed-signal circuits, understand key performance limitations such as noise and distortion, and apply this knowledge to practical electronic system design problems.</p> |                        |               |             |

**Module 54**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Module Title           | ECTS          | Semester    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL416                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Statistics             | 2             | 7           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | —                      | 33            | 17          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                        |               |             |
| <p>This module introduces probability and statistical methods relevant to electrical engineering analysis and design. Topics include probability theory fundamentals, random variables and probability distributions; statistical measures such as mean, variance, and correlation; an introduction to random processes relevant to noise and signal analysis; and basic statistical inference techniques including estimation and hypothesis testing. Emphasis is placed on applications relevant to communication systems, reliability analysis, and experimental data interpretation. Tutorial exercises reinforce the application of statistical methods to representative engineering problems. By the end of the module, students should be able to apply probability and statistical methods to analyze engineering data and systems, supporting further study and research activities in communication and reliability-related topics.</p> |                        |               |             |

**Module 55**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Module Title            | ECTS          | Semester    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------|-------------|
| EL417                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Engineering Project (I) | 3             | 7           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | OLect/Lab./Prac./Tutor  | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Pr 2                    | 63            | 12          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                         |               |             |
| <p>This module provides students with an opportunity to apply the technical knowledge and skills developed throughout the curriculum to an independent or team-based engineering project. Students select a project topic, relevant to electrical engineering, in consultation with a supervising instructor, and undertake stages of problem definition, literature review, design or analysis, and preliminary implementation. The module emphasizes project planning, technical documentation, and the practical application of engineering principles to a substantive problem. Regular progress meetings and a project report or presentation form part of the assessment. By the end of the module, students should be able to plan and execute an engineering project systematically, apply relevant technical knowledge to a practical problem, and communicate their work effectively, preparing them for the capstone project in the final semester.</p> |                         |               |             |

**Module 56**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Module Title           | ECTS          | Semester    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL418                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Professional Ethics    | 2             | 7           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | —                      | 33            | 17          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                        |               |             |
| <p>This module introduces students to the ethical principles and professional responsibilities relevant to engineering practice. Topics include foundational ethical theories and their application to engineering decision-making; professional codes of conduct; engineers' responsibilities toward public safety, health, and the environment; conflicts of interest and professional integrity; and case studies examining ethical dilemmas encountered in engineering practice. Discussion-based sessions encourage students to critically analyze real and hypothetical scenarios and to develop reasoned ethical judgments. By the end of the module, students should understand the ethical responsibilities of the engineering profession, be able to identify and analyze ethical issues in engineering contexts, and apply professional and ethical principles to their future engineering practice.</p> |                        |               |             |

**Module 57**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Module Title             | ECTS          | Semester    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|---------------|-------------|
| EL421                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Power System Analysis II | 4             | 8           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | OLect/Lab./Prac./Tutor   | SSWL (hr/sem) | USWL (hr/w) |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Tut 1                    | 63            | 37          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                          |               |             |
| <p>This module builds on Power System Analysis I to cover advanced topics in power system operation and analysis. Topics include optimal power flow and economic dispatch with constraints; power system stability analysis, including transient and small-signal stability concepts; an introduction to power system protection coordination; and voltage stability considerations. Computational exercises reinforce the application of these advanced analysis techniques to representative power networks. By the end of the module, students should be able to apply advanced power flow and stability analysis techniques, understand the principles of power system protection coordination, and evaluate power system performance under various operating conditions, preparing them for professional practice or further study in power systems engineering.</p> |                          |               |             |

**Module 58**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Module Title           | ECTS          | Semester    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL422                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Special Machines       | 6             | 8           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Lab 2 / Tut 1          | 78            | 72          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                        |               |             |
| <p>This module introduces electrical machines beyond the conventional AC and DC machines studied in earlier modules. Topics include stepper motors and their control; brushless DC motors; permanent magnet synchronous machines; switched reluctance machines; and an overview of machine selection criteria for specialized applications such as robotics, electric vehicles, and precision positioning systems. Emphasis is placed on the operating principles and control considerations distinguishing these machines from conventional types. Simulation-based sessions allow students to observe the operation and control of selected special machine types. By the end of the module, students should be able to describe the operating principles of special electrical machines and evaluate their suitability for specialized industrial and emerging technology applications.</p> |                        |               |             |

**Module 59**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Module Title           | ECTS          | Semester    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---------------|-------------|
| EL423                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Digital Communication  | 5             | 8           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | OLect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Lab 2 / Tut 1          | 78            | 47          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                        |               |             |
| <p>This module provides an advanced treatment of digital communication system design building on earlier communication modules. Topics include baseband and passband digital transmission techniques; advanced digital modulation schemes and their spectral and error-rate performance; an introduction to channel coding for error control; multiplexing techniques; and an overview of modern digital communication system architectures. Laboratory or simulation-based sessions allow students to implement and evaluate digital modulation and coding schemes. By the end of the module, students should be able to design and evaluate digital communication links, compare the performance of different modulation and coding schemes, and understand the architecture of modern digital communication systems, extending the foundation established in Communication I and II.</p> |                        |               |             |

**Module 60**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Module Title                | ECTS          | Semester    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|---------------|-------------|
| EL424                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Intelligent Control Systems | 5             | 8           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | OLect/Lab./Prac./Tutor      | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Lab 2 / Tut 1               | 78            | 47          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                             |               |             |
| <p>This module introduces intelligent and computational approaches to control system design. Topics include an introduction to fuzzy logic control; fundamentals of artificial neural networks and their application to control problems; an overview of genetic algorithms and other optimization-based control design methods; and comparisons between intelligent control approaches and classical control techniques. Simulation-based sessions allow students to design and evaluate intelligent controllers for representative systems. By the end of the module, students should be able to describe the principles underlying fuzzy logic and neural network-based control, design basic intelligent controllers using simulation tools, and appreciate the advantages and limitations of intelligent control approaches relative to classical methods studied in earlier control modules.</p> |                             |               |             |

**Module 61**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Module Title            | ECTS          | Semester    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------|-------------|
| EL425                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Advanced Electronics II | 4             | 8           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | OLect/Lab./Prac./Tutor  | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Tut 1                   | 48            | 52          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                         |               |             |
| <p>This module extends the study of advanced electronic systems to cover specialized topics relevant to modern engineering applications. Topics include radio-frequency (RF) circuit design fundamentals; advanced power supply and voltage regulation circuits; sensor interfacing and signal conditioning; and an introduction to mixed-signal system integration considerations relevant to embedded applications. Emphasis is placed on practical design considerations for real-world electronic systems. Laboratory sessions provide hands-on design and testing of specialized circuits relevant to sensing, RF, or power applications. By the end of the module, students should be able to design and evaluate specialized electronic circuits, understand key considerations in RF and sensor interfacing applications, and apply this knowledge to practical electronic system design problems.</p> |                         |               |             |



**Module 62**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Module Title                       | ECTS          | Semester    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|---------------|-------------|
| EL426                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Elective: Renewable Energy Systems | 3             | 8           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | OLect/Lab./Prac./Tutor             | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Tut 1                              | 48            | 27          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                    |               |             |
| <p>This elective module introduces the principles and technologies of renewable energy generation and integration into electrical power systems. Topics include solar photovoltaic system fundamentals; wind energy conversion systems; basic principles of other renewable sources such as hydro and biomass where relevant; power electronic interfaces for renewable energy integration; and considerations for grid integration of distributed renewable generation. Emphasis is placed on connecting renewable energy technology to the power system and power electronics concepts studied in earlier modules. By the end of the module, students should be able to describe the operating principles of major renewable energy technologies, understand basic system sizing and integration considerations, and appreciate the role of renewable energy in modern electrical power systems.</p> |                                    |               |             |

**Module 63**

| Code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Module Title             | ECTS          | Semester    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|---------------|-------------|
| EL427                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Engineering Project (II) | 3             | 8           |
| Class (hr/w)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | OLect/Lab./Prac./Tutor   | SSWL (hr/sem) | USWL (hr/w) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Pr 2                     | 63            | 12          |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                          |               |             |
| <p>This capstone module builds on Engineering Project I, allowing students to complete and finalize an independent or team-based engineering project that integrates knowledge and skills developed throughout the curriculum. Students carry out the design, analysis, implementation, and testing stages of their project, culminating in a comprehensive technical report and a final presentation or defense before faculty. The module emphasizes independent technical work, critical evaluation of results, and professional communication of engineering outcomes. Regular supervision and progress assessment support students in achieving project objectives. By the end of the module, students should be able to independently execute a substantial engineering project from design through completion, critically evaluate their results, and communicate their work at a professional standard appropriate for graduating engineers.</p> |                          |               |             |

### 3. Contact

Program Manager:

Mohammed Khalaf Juma | Ph.D. in Electrical Engineering/power | Assistant Professor

Email: [muhammed.kh@uomisan.edu.iq](mailto:muhammed.kh@uomisan.edu.iq)

Mobile no.:07729245003

Program Coordinator:

Khalid waleed Nasser | MS.c.. in Electrical Engineering/power| Lecture

Email: [khalid.waleed@uomisan.edu.iq](mailto:khalid.waleed@uomisan.edu.iq)

Mobile no.: 07702787670

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امسح الكود للوصول إلى النسخة الإلكترونية