

# University of Baghdad

## جامعة بغداد



### *First Cycle – Bachelor's Degree (B.Sc.) - Electrical Engineering*

بكالوريوس - هندسة كهربائية



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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 program delivers (41) 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 البرنامج (41) مادة دراسية، مع (٦٠٠٠) إجمالي ساعات حمل الطالب و ٢٤٠ إجمالي وحدات أوروبية. يعتمد تقديم المواد الدراسية على عملية بولونيا.

### 2. Undergraduate Courses 2023-2024

#### Module 1

Code	Course/Module Title	ECTS	Semester
UOB102	English I	2	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	17
Description			
<p>The course is designed for university students at the Beginner level who want to use their English for international communication. The course is built upon material taken from <u>New Headway Plus</u> [Beginner], and modern scientific articles from the news related to the students' speciality. The four skills of listening, speaking, writing and reading are developed throughout the course. The integrated skills approach of the course develops the student's self-confidence to survive and succeed in professional and social encounters within an English-speaking global community.</p>			

**Module 2**

Code	Course/Module Title	ECTS	Semester
EE108	Electronic Physics	8	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
6	1	108	92
Description			
<p>The Electronic Physics module comprehensively explores the principles and theories underpinning electronic devices and their practical applications. Students delve into the behavior of electrons within different materials and their interactions with electric and magnetic fields. Topics covered include semiconductor physics, solid-state physics, and the characterization of electronic devices. The module emphasizes the fundamental principles governing components like transistors and diodes. By gaining a deep understanding of carrier transport, band theory, and the physics of electronic materials, students are equipped to contribute to the design, development, and optimization of electronic devices for diverse applications such as communication systems, information technology, and consumer electronics.</p>			

**Module 3**

Code	Course/Module Title	ECTS	Semester
EE101	Mathematics I	7	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
6	1	108	67
Description			
<p>This module introduces students to limits, continuity, differentiation, and integral calculus. They learn to calculate derivatives, analyze rates of change and optimization problems, and apply integration techniques to compute areas, volumes, and accumulated change. Students develop a strong understanding of calculus principles and their relevance across various academic fields through practical problem-solving and real-world applications. The module further covers advanced integration techniques, including integration by parts and trigonometric substitutions and sequences, series, and their convergence properties. Multivariable calculus topics, such as functions of several variables, partial derivatives, and multiple integrals, are also explored. Students engage in problem-solving exercises to enhance critical thinking skills and gain the ability to tackle complex problems using calculus.</p>			

**Module 4**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
UOB103	Computer I	3	1
<b>Class (hr/w)</b>	<b>Lect/Lab./Prac./Tutor</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
1	2	48	27
<b>Description</b>			

**Module 5**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
EE104	Fundamentals of Mechanical Eng.	5	1
<b>Class (hr/w)</b>	<b>Lect/Lab./Prac./Tutor</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
4		63	62
<b>Description</b>			
<p>The "Fundamentals of Mechanical Engineering" module provides students a foundational understanding of statics, dynamics, and thermodynamics. In statics, students learn about forces and equilibrium in stationary objects. Dynamics focuses on the motion of objects and the forces causing it. Thermodynamics covers energy transformations and conservation. Through practical applications and problem-solving exercises, students develop analytical skills to tackle engineering problems. This module serves as a stepping stone for further studies in mechanical engineering, equipping students with the necessary knowledge and skills to pursue more advanced concepts and challenges in the field.</p>			

**MODULE 6**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
UOB101	Democracy and Human Rights	2	1
<b>Class (hr/w)</b>	<b>Lect/Lab./Prac./Tutor</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
2		33	17
<b>Description</b>			
<p>The Human Rights module comprehensively explores key human rights issues, including civil liberties, social justice, and equality. Through case studies and real-world examples, students deeply understand human rights violations' complexities. The module encourages critical thinking and raises awareness of global human rights challenges. By the end of the module, students are empowered to advocate for human rights, promote social justice, and contribute to positive change in their communities and beyond.</p>			

**MODULE 7**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
EE105	AutoCAD	2	1
<b>Class (hr/w)</b>	<b>Lect/Lab./Prac./Tutor</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
	3	48	27
<b>Description</b>			
<p>The AutoCAD module provides students a comprehensive introduction to computer-aided design (CAD) using the popular AutoCAD software. Students gain proficiency in creating precise technical drawings and models and learning key drafting and design principles. They explore a range of tools and commands to generate 2D and 3D models, including tasks like creating geometry, adding dimensions, and annotating drawings. The module emphasizes hands-on learning through practical design projects, allowing students to apply their skills to real-world scenarios. By the end of the module, students develop strong spatial visualization, accurate drafting, and effective project documentation abilities. They acquire valuable CAD skills essential for engineering and architectural design, empowering them to communicate and present their ideas using industry-standard software confidently.</p>			

**Module 8**

Code	Course/Module Title	ECTS	Semester
EE109	Digital Techniques	5	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	2	78	47
Description			
<p>The Digital Techniques module gives students a comprehensive understanding of digital electronics and logic circuits. Students learn fundamental concepts such as binary representation, logic gates, Boolean algebra, and combinational and sequential circuits. Students gain practical experience in designing and analyzing digital circuits through hands-on practice using hardware tools. The module covers digital arithmetic, memory units, and programmable logic devices. Through practical exercises and projects, students develop skills in circuit analysis, troubleshooting, and the design of complex digital systems.</p>			

**Module 9**

Code	Course/Module Title	ECTS	Semester
EE107	Fundamentals of Electrical Eng.	9	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
6	2	123	102
Description			
<p>The Fundamentals of Electrical Engineering module is designed to provide students with a comprehensive understanding of DC circuits, AC circuits, and magnetic circuits. Students learn essential concepts related to circuit analysis, including Ohm's law, Kirchhoff's laws, and the behavior of resistors, capacitors, and inductors in DC circuits. In the AC circuit component, students focus on topics such as impedance, phasors, power calculations, and the behavior of reactive components. The module also covers magnetic circuits, exploring magnetic field concepts, inductance, and the properties of magnetic materials. Through theoretical learning, and problem-solving exercises, students develop a solid foundation in electrical engineering principles relevant to DC circuits, AC circuits, and magnetic circuits.</p>			

**Module 10**

Code	Course/Module Title	ECTS	Semester
UOB110	Arabic Language	2	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	17
Description			
<p>يتضمن منهج اللغة العربية للأقسام غير الاختصاص مراجعة لما تعلمه الطالب في مرحلة المتوسطة والاعدادية مع تعزيز معلوماته ورفده بمعلومات جديدة تساعد على تنمية مهاراته في التعبير والكتابة بلغة عربية فصحة سليمة خالية من الأخطاء الإملائية والنحوية وتصحيح ما اعتاد عليه من أخطاء لغوية شائعة فضلا عن تزويده بالشجاعة الأدبية التي تغني ملكة الإلقاء عنده في المحافل والمؤتمرات .</p> <p>ينقسم المنهج على ثلاثة محاور : الاول المحور النحوي واللغوي ويتضمن قواعد اللغة العربية وتطبيقاتها الاعرابية مع الأخطاء اللغوية الشائعة ، الثاني المحور الإملائي وفيه يتعرف الطالب على كتابة الهمزات بصورة صحيحة المتوسطة ( الالف ، الواو ، النبرة ) والمتطرفة مع الوقوف على الحروف التي تزداد في الكتابة وطريقة التميز بين الظاء والضاد ، لتجنب الوقوع في الأخطاء الإملائية وكتابة الكلمات بصورة صحيحة وسليمة ، المحور الثالث المحور الأدبي وفيه يتعرف الطالب على نماذج من الشعر القديم أو الحديث حفظا وتحليلا، أما مصادر الدرس فهي مصادر اللغة العربية المتنوعة بين المراجع والمصادر، فضلا عن وجود مؤلفات عدة تحت عنوان :منهج اللغة العربية لغير الاختصاص.</p>			

**Module 11**

Code	Course/Module Title	ECTS	Semester
EE106	Electrical Eng. Labs. I	10	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
	10	156	94
Description			
<p>The module offers hands-on learning opportunities for students to gain practical experience working with DC and AC circuits. Through engaging laboratory experiments, students delve into the essential concepts of electrical circuits. They familiarize themselves with components like resistors, capacitors, and inductors in DC circuits and explore topics such as impedance, resonance, and frequency response in AC circuits. Students sharpen their skills in circuit design, troubleshooting, and analysis techniques by conducting circuit analysis and measurements. The laboratory component reinforces theoretical knowledge and equips students with the practical skills necessary for real-world applications in electrical engineering.</p>			

## Module 12

Code	Course/Module Title	ECTS	Semester
EE110	Computer Programming	4	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4		63	37
Description			
<p>The module is all about learning how to write computer programs. Students start by understanding the basic building blocks of programming, like variables, loops, and functions. They also learn how to solve problems using step-by-step instructions called algorithms. Through hands-on activities and projects, students practice writing programs and solving real-world problems. By the end of the module, students can create their simple software applications. This module is a great starting point for anyone interested in learning how to code and build things with computers.</p>			

## Module 13

Code	Course/Module Title	ECTS	Semester
EE207	Electrical Circuits	8	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
5	2	108	92
Description			
<p>This module expands on the foundational knowledge gained in basic electrical circuits. It explores more complex aspects of circuit analysis and design. Students delve into topics such as network theorems, transient response, frequency response, resonance, and two-port networks. AC and DC circuits are covered, emphasizing impedance, phasors, transfer functions, and filter design. Through theoretical study, simulations, and hands-on experiments, students enhance their ability to tackle intricate circuit problems. By the end of the module, students will possess advanced electrical circuit analysis and design proficiency, equipping them for electronics, power systems, and communications applications.</p>			



**Module 14**

Code	Course/Module Title	ECTS	Semester
EE209	Mathematics II	7	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
5	2	108	67
Description			
<p>The "Mathematics II" module is designed to provide students with a comprehensive understanding of ordinary and partial differential equations. Students learn key concepts such as first-order and second-order linear differential equations and systems of differential equations. They explore various solution techniques, including separation of variables, integrating factors, and Laplace transforms. The module also covers partial differential equations, focusing on classification, boundary value problems, and methods like separation of variables and Fourier series. Students develop strong skills in solving and analyzing differential equations through theoretical study and practical problem-solving exercises.</p>			

**Module 15**

Code	Course/Module Title	ECTS	Semester
EE205	Electromagnetic Fields	7	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
5	1	93	82
Description			
<p>The Electromagnetic Fields module offers students a comprehensive understanding of the fundamental principles of electromagnetic fields. Students delve into topics such as electrostatics, magnetostatics, and electromagnetic wave phenomena. They study Maxwell's equations, electric and magnetic fields, and the behavior of charges and currents. The module explores Gauss's law, Ampere's law, Faraday's law, and the propagation of electromagnetic waves. Through theoretical exploration, mathematical analysis, and practical applications, students gain a strong foundation in electromagnetic theory and its practical implications. By the module's conclusion, students possess the knowledge and skills to analyze and design electromagnetic systems across various engineering disciplines.</p>			

**Module 16**

Code	Course/Module Title	ECTS	Semester
UOB201	Computer II	3	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
1	2	48	27
Description			

**Module 17**

Code	Course/Module Title	ECTS	Semester
EE204	Numerical Methods & Statistics	3	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3		48	27
Description			
<p>The Numerical Methods &amp; Statistics module provides students with a comprehensive understanding of mathematical problem-solving techniques and data analysis methods. Students explore numerical methods such as interpolation, approximation, and numerical integration, which are applied to solve complex equations and simulate real-world scenarios. The module also covers statistical analysis, including descriptive statistics, probability distributions, hypothesis testing, and regression analysis. Through practical exercises, students gain hands-on experience in applying numerical methods and conducting statistical analysis. By the end of the module, students develop the skills to employ numerical methods in engineering and scientific computations and make informed decisions based on statistical data analysis.</p>			

**Module 18**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
UOB202	Baath Party Crimes	2	3
<b>Class (hr/w)</b>	<b>Lect/Lab./Prac./Tutor</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
2		33	17
<b>Description</b>			

**Module 19**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
EE201	Microprocessor and Computer Interfacing	5	4
<b>Class (hr/w)</b>	<b>Lect/Lab./Prac./Tutor</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
3	1	63	62
<b>Description</b>			
<p>This module focuses on advanced programming concepts and their practical applications. It covers three main areas: assembly language programming, Matlab programming, and microprocessor interfacing. Students learn low-level programming and hardware manipulation through assembly language programming. They develop skills in data analysis, algorithm development, and simulation using Matlab programming. The module also explores microprocessor interfacing, enabling students to connect and control external devices using microcontrollers. Through theoretical study and hands-on programming exercises, students gain proficiency in these areas. By the end of the module, students possess valuable programming skills applicable to various fields, including embedded systems, signal processing, and control systems.</p>			

**Module 20**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
EE203	Electrical Machines I	6	4
<b>Class (hr/w)</b>	<b>Lect/Lab./Prac./Tutor</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
4	1	78	72
<b>Description</b>			
<p>The Electrical Machines I module provides a comprehensive understanding of DC machines and single-phase and three-phase transformers. Students explore the principles, construction, and operation of DC machines, including topics such as armature winding and speed control. They also study single-phase and three-phase transformers, focusing on magnetic coupling, transformer types, and their operation. By the end of the module, students develop skills in analyzing, designing, and troubleshooting DC machines and transformers. This prepares them for various electrical engineering fields, such as power systems, motor control, and energy conversion.</p>			

**Module 21**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
EE206	Electronics I	6	4
<b>Class (hr/w)</b>	<b>Lect/Lab./Prac./Tutor</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
4	1	78	72
<b>Description</b>			
<p>The Electronics I module offers students a comprehensive introduction to the field of electronics. It covers fundamental concepts including semiconductor devices, diodes, and basic transistor circuits. Students learn to analyze and design a range of electronic circuits, such as amplifiers, oscillators, and digital logic circuits. Through theoretical study, students gain skills in circuit construction and troubleshooting. The module emphasizes the real-world application of electronics in industries such as telecommunications, consumer electronics, and automation. By the module's conclusion, students possess a strong foundation in electronics, equipping them with the knowledge and ability to work with essential electronic components and circuits in their future endeavors.</p>			

**Module 22**

Code	Course/Module Title	ECTS	Semester
UOB204	English language II	2	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	17
Description			
<p>The course is designed for university students at the Pre-intermediate level who want to use their English for international communication. The course is built upon material taken from <u>New Headway Plus</u> [Pre-intermediate], and modern scientific articles from the news related to the students' speciality. The four skills of listening, speaking, writing and reading are developed throughout the course. The integrated skills approach of the course develops the student's self-confidence to survive and succeed in professional and social encounters within an English-speaking global community.</p>			

**Module 23**

Code	Course/Module Title	ECTS	Semester
EE208	Electrical Eng. Labs.II	9	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
	11	174	51
Description			
<p>The Electrical Eng. Labs. II module offers students hands-on experience conducting experiments on electric and electronic circuits. Students reinforce their understanding of theoretical concepts learned in lectures through practical applications. The module covers a range of experiments, including circuit analysis, measurement of electrical quantities, and verification of circuit laws. Students also gain practical skills in working with electronic circuits such as amplifiers, oscillators, and digital logic circuits. The module aims to enhance students' circuit construction, measurement techniques, and troubleshooting abilities. Students solidify their electrical and electronic principles knowledge by actively participating in these laboratory activities, preparing them for real-world engineering challenges.</p>			

**Module 24**

Code	Course/Module Title	ECTS	Semester
UOBE203	Arabic Language II	2	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	17
Description			
<p>يتضمن منهج اللغة العربية للأقسام غير الاختصاص مراجعة لما تعلمه الطالب في مرحلة المتوسطة والاعدادية مع تعزيز معلوماته ورفده بمعلومات جديدة تساعده على تنمية مهاراته في التعبير والكتابة بلغة عربية فصحة سليمة خالية من الأخطاء الإملائية والنحوية وتصحيح ما اعتاد عليه من أخطاء لغوية شائعة فضلا عن تزويده بالشجاعة الأدبية التي تغني ملكة الإلقاء عنده في المحافل والمؤتمرات .</p> <p>ينقسم المنهج على ثلاثة محاور : الاول المحور النحوي واللغوي ويتضمن قواعد اللغة العربية وتطبيقاتها الاعرابية مع الأخطاء اللغوية الشائعة ، الثاني المحور الإملائي وفيه يتعرف الطالب على كتابة الهمزات بصورة صحيحة المتوسطة ( الالف ، الواو ، النبرة ) والمتطرفة مع الوقوف على الحروف التي تزداد في الكتابة وطريقة التميز بن الظاء والضاد ، لتجنب الوقوع في الأخطاء الإملائية وكتابة الكلمات بصورة صحيحة وسليمة ، المحور الثالث المحور الأدبي وفيه يتعرف الطالب على نماذج من الشعر القديم أو الحديث حفظا وتحليلا ، أما مصادر الدرس فهي مصادر اللغة العربية المتنوعة بين المراجع والمصادر ، فضلا عن وجود مؤلفات عدة تحت عنوان :منهج اللغة العربية لغير الاختصاص.</p>			

#### Module 25

Code	Course/Module Title	ECTS	Semester
EE308	Advanced Microprocessor	5	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	1	78	47
Description			
<p>The Advanced Microprocessor module offers an in-depth exploration of advanced microprocessor architectures and their applications. Students delve into topics such as microprocessor structure, instruction set architecture, and interfacing techniques. They gain experience in programming microprocessors and connecting them with external devices. The module covers advanced concepts like pipelining, cache memory, virtual memory, and parallel processing. Students explore real-world applications in areas like embedded systems, and signal processing. By the module's end, students develop a strong understanding of advanced microprocessor principles and acquire the skills to design and implement complex microprocessor-based systems.</p>			

**Module 26**

Code	Course/Module Title	ECTS	Semester
EE305	Electrical Machines II	6	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	2	93	57
Description			
<p>The Electrical Machines II module presents a study of single and three-phase induction machines and synchronous machines. Students explore these electrical machines' operational principles, characteristics, and control methods. They comprehensively understand induction machines' design considerations and performance aspects, including starting techniques, speed control, and efficiency optimization. Additionally, the module covers synchronous machines, including their applications in power systems as generators and motors. Students develop the skills to analyze, design, and troubleshoot electrical machines effectively through theoretical analysis. By the end of the module, students acquire the knowledge and proficiency necessary to work with and optimize the performance of these machines in diverse industrial settings.</p>			

**Module 27**

Code	Course/Module Title	ECTS	Semester
EE303	Engineering Analysis	5	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	1	78	47
Description			
<p>The Engineering Analysis module equips students with essential mathematical tools for solving engineering problems. It covers Fourier series, Fourier transform, Laplace transform, and Z-transform, among other topics. Students learn to analyze and solve complex engineering problems related to signal processing, system analysis, and control theory by studying these concepts. The module emphasizes practical applications through problem-solving exercises and real-world examples. Students develop a strong foundation in engineering analysis, enabling them to apply mathematical techniques to various engineering disciplines. Overall, the module provides students with the necessary skills to effectively analyze and design engineering systems using mathematical tools and methods.</p>			

**Module 28**

Code	Course/Module Title	ECTS	Semester
EE304	Electrical Power I	5	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	1	78	47
Description			
<p>The Electrical Power I module offers students a comprehensive exploration of essential concepts related to electrical power systems. It covers a range of topics, including power generation, transmission, and distribution. Students explore various types of power plants, their functioning, and the production of electrical energy. Additionally, they study power transmission and distribution systems, transmission lines, and distribution networks. The module highlights the analysis and design of power systems.</p>			

### Module 29

Code	Course/Module Title	ECTS	Semester
EE306	Communications I	6	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	2	93	57
Description			
<p>The Communications I module provides students with an introduction to analog communications systems. It covers topics such as modulation techniques, signal transmission, noise, and system design. Students develop a solid understanding of analog communication principles and acquire the skills to analyze and design analog communication systems. By the end of the module, students are prepared to apply their knowledge and expertise in various applications involving analog communication technologies.</p>			

### Module 30



Code	Course/Module Title	ECTS	Semester
EE301	Antenna and Wave Propagation	6	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	2	93	57
Description			
<p>The Antenna and Wave Propagation module focuses on the study of antennas and the propagation of waves, with a specific emphasis on waveguides. Students gain a comprehensive understanding of antenna principles, design techniques, and various types of antennas. The module also explores the behavior of electromagnetic waves within waveguides, including the analysis of different modes of propagation and the characteristics of waveguide structures. Through theoretical study, students develop the necessary skills to design and analyze antennas and waveguides and understand wave propagation in waveguide systems. By the end of the module, students are well-equipped to contribute to the field of antenna design and the study of wave propagation in waveguide environments.</p>			

### Module 31

Code	Course/Module Title	ECTS	Semester
EE302	Electronics II	6	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	2	93	57
Description			
<p>The Electronics II module expands upon the foundational knowledge acquired in Electronics I, delving into more advanced concepts and applications in electronic circuits and systems. This module focuses on amplifiers, operational amplifiers, and feedback systems. Students explore diverse electronic circuits and components' design, analysis, and characterization. They gain insights into amplifier configurations, frequency response, and the utilization of operational amplifiers for signal processing. Upon completion, students possess a comprehensive understanding of advanced electronic circuits and systems, equipping them for further academic pursuits or professional endeavors in areas such as electronics engineering, telecommunications, or embedded systems.</p>			

### Module 32

Code	Course/Module Title	ECTS	Semester
EE309	Mathematical Modelling and Control Engineering I	4	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4		63	37
Description			
<p>In this module, students learn to model control systems mathematically, use block diagrams, and analyze their behavior in the time domain. The module also covers techniques to simplify complex systems through block reduction. Students study stability criteria, including the Routh-Hurwitz criterion, and examine root locus plots to understand the impact of system parameters on stability. Additionally, they explore Nyquist plots, which provide insights into system stability and frequency response. Students develop a strong grasp of control systems analysis techniques through theoretical study, problem-solving, and practical examples. By the end of the module, they acquire the skills to design and analyze basic control systems, assess their stability, and evaluate their performance characteristics.</p>			

### Module 33

Code	Course/Module Title	ECTS	Semester
EE307	Electrical Eng. Labs.III	12	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
	12	186	114
Description			
<p>The Electrical Eng. Labs III module offers hands-on experiments related to single and three-phase transformers and single-phase and three-phase induction motors. Students actively participate in practical activities to understand the working principles and characteristics of these electrical machines. The module encompasses experiments that analyze transformer performance, including voltage regulation and efficiency. Additionally, students conduct experiments on single-phase and three-phase induction motors to explore aspects such as motor performance, efficiency, and power factor. These laboratory sessions enable students to develop practical skills in operating, analyzing, and troubleshooting electrical machines. They learn how to interpret experimental data, identify and rectify issues, and evaluate the overall performance of transformers and motors. By the conclusion of the module, students acquire valuable practical knowledge and experience essential for real-world applications in electrical engineering.</p>			

### Module 34

Code	Course/Module Title	ECTS	Semester
UOBE310	English language III	2	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	17
Description			
<p>The Academic English module is specifically designed to enhance students' English language proficiency for academic purposes. With a strong focus on reading, writing, listening, and speaking skills, the module aims to improve students' abilities to engage with academic materials and succeed in their studies effectively. Through a range of interactive activities and exercises, students develop their comprehension skills for academic texts, refine their writing abilities for essays and research papers, and strengthen their presentation and discussion skills. The module also covers advanced grammar and vocabulary essential for academic discourse. By actively participating in lessons and practicing these skills, students gain the necessary tools to analyze academic content, express their ideas clearly, and confidently engage in academic discussions. Ultimately, the Academic English module equips students with the language proficiency required to thrive in an academic setting and effectively communicate their knowledge and ideas.</p>			

### Module 35

Code	Course/Module Title	ECTS	Semester
EE408	Electrical Eng. Labs.IV	9	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
	10	160	65
Description			
<p>The Electrical Eng. Labs IV module offers a diverse range of hands-on experiments covering multiple areas of electrical engineering. Students gain practical experience in power systems, including fault analysis and voltage regulation. They also explore induction motors, generators, synchronization, protective relays, advanced analog electronics, control system engineering, and power electronics. Through these experiments, students acquire practical skills, deepen their understanding of electrical engineering concepts, and develop valuable experience in various subfields. The module enables students to apply theoretical knowledge to real-world scenarios, enhancing their problem-solving abilities and preparing them for professional practice in the field of electrical engineering.</p>			

**Module 36**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
EE402	Engineering Project	3	7
<b>Class (hr/w)</b>	<b>Lect/Lab./Prac./Tutor</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
2	1	51	24
<b>Description</b>			
<p>The Engineering Project module is divided into two sections, each focusing on different aspects of project development. In the first section (semester 7), students delve into the theoretical background of their chosen project topic and conduct an extensive literature review to gather relevant information. Based on their research, they formulate a proposal that outlines the objectives, methodology, and expected outcomes of the project.</p> <p>In the second section (Semester 8), students shift their focus to the implementation of their proposed project. They have the option to simulate the project using software tools or carry out practical implementation if applicable. Throughout this phase, students collect data, analyze the results, and draw meaningful conclusions. They also identify any limitations or challenges encountered during the project and discuss potential future work or improvements.</p> <p>By engaging in the Engineering Project module, students develop essential skills such as project management, research, critical thinking, and problem-solving. They gain hands-on experience in applying theoretical knowledge to real-world scenarios and contribute to the advancement of their field through their project work.</p>			

**Module 37**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
EE406	Power Electronics and Special Machines	6	7
<b>Class (hr/w)</b>	<b>Lect/Lab./Prac./Tutor</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
4	1	78	72
<b>Description</b>			
<p>The Power Electronics and Special Machines module focuses on the study of power electronic converters and specialized motor designs. Students explore a range of power electronic converters such as rectifiers, DC-DC converters, choppers, inverters, and DC-AC converters. They gain a thorough understanding of their operation, control techniques, and applications in diverse electrical systems.</p> <p>Furthermore, the module covers unique types of machines that deviate from conventional motor configurations. These include AC series motors, repulsion motors, repulsion induction motors, repulsion start induction motors, reluctance motors, stepper motors, and BLDC motors. Students delve into the principles, characteristics, control methods, and practical uses of these specialized machines.</p> <p>By engaging in hands-on experiments and practical applications, students develop a comprehensive grasp of power electronics and special machines. They acquire the skills to design, analyze, and troubleshoot power electronic converters and become knowledgeable about the distinctive features and performance of specialized motors. This module equips students with the expertise necessary to contribute to the field of power electronics and special machines across various industries.</p>			

Code	Course/Module Title	ECTS	Semester
EE409	Digital Signal Processing	3	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	1	48	27
Description			
<p>The Digital Signal Processing (DSP) module focuses on the theory, algorithms, and applications of processing digital signals. Students learn about signal representation, analysis, and manipulation, as well as techniques for filtering, modulation, compression, and spectral analysis. Topics covered include discrete-time systems, sampling, quantization, digital filters (FIR and IIR), multirate signal processing, adaptive filtering, and digital image processing. Through hands-on experience with software tools and programming languages, students gain practical skills in DSP. By the end of the module, they have a strong foundation in DSP principles and techniques, ready to apply their knowledge in various fields such as telecommunications, audio and video processing, and biomedical engineering.</p>			

### Module 39

Code	Course/Module Title	ECTS	Semester
EE401	Mathematical Modelling and Control Engineering II	6	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
5		78	72
Description			
<p>The module explores advanced control techniques and theories, focusing on the design of controllers for complex systems. Students learn about the design and analysis of lag lead compensators, PID controllers, and other classical control techniques. They gain insights into how these controllers can be employed to improve system performance, stability, and response time. Additionally, the module explores modern control theory, with an emphasis on state space representation and analysis. Students learn how to model systems in state space form and design state feedback controllers. They also study concepts such as observability, controllability, and stability in the state space framework. By the end of the module, students acquire a comprehensive understanding of both classical and modern control techniques, equipping them with the skills to tackle complex control problems in various engineering applications.</p>			

**Module 40**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
EE402	Engineering Project	5	8
<b>Class (hr/w)</b>	<b>Lect/Lab./Prac./Tutor</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
2	2.5	70.5	54.5
<b>Description</b>			
<p>The Engineering Project module is divided into two sections, each focusing on different aspects of project development. In the first section (semester 7), students delve into the theoretical background of their chosen project topic and conduct an extensive literature review to gather relevant information. Based on their research, they formulate a proposal that outlines the objectives, methodology, and expected outcomes of the project.</p> <p>In the second section (Semester 8), students shift their focus to the implementation of their proposed project. They have the option to simulate the project using software tools or carry out practical implementation if applicable. Throughout this phase, students collect data, analyze the results, and draw meaningful conclusions. They also identify any limitations or challenges encountered during the project and discuss potential future work or improvements.</p> <p>By engaging in the Engineering Project module, students develop essential skills such as project management, research, critical thinking, and problem-solving. They gain hands-on experience in applying theoretical knowledge to real-world scenarios and contribute to the advancement of their field through their project work.</p>			

**Module 41**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
EE404	Communications II	5	8
<b>Class (hr/w)</b>	<b>Lect/Lab./Prac./Tutor</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
2	2	63	62
<b>Description</b>			
<p>The Communications II module focuses on advanced topics in communication systems, specifically information theory and digital communication. Students delve into the fundamental principles of information theory, which involves quantifying and transmitting information effectively. They explore concepts like entropy, channel capacity, and error correction codes. The module also covers digital communication, which entails transmitting and receiving digital signals across different communication channels. Students learn about modulation techniques such as amplitude shift keying (ASK), frequency shift keying (FSK), and phase shift keying (PSK). They also gain knowledge about error detection and correction methods utilized in digital communication systems. Through theoretical analysis and practical exercises, students develop a strong understanding of information theory and digital communication. This equips them to design and analyze advanced communication systems with enhanced efficiency and reliability.</p>			

**Module 42**



Code	Course/Module Title	ECTS	Semester
EE405	Electrical Power II	6	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	1	78	72
Description			
<p>The Electrical Power II module focuses on various aspects of electrical power systems. Students delve into topics such as the symmetrical components theorem, which helps analyze unbalanced conditions in power networks. They also study load flow studies to understand power transfer and system stability, as well as fault analysis to identify and address potential system faults. The module covers the role of synchronous machines in power generation and transmission, along with equal area stability criteria to assess system stability during disturbances. Students also explore fundamental protective devices like fuses, circuit breakers, and protective relays that ensure the safety and reliability of power systems. Through theoretical study and practical applications, students gain a comprehensive understanding of electrical power systems and their components.</p>			

#### Module 43

Code	Course/Module Title	ECTS	Semester
EE403	Digital systems Design	6	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	1	78	72
Description			
<p>The Digital Systems Design module focuses on designing and implementing digital logic systems. Students learn about logic system design, which involves designing and optimizing circuits using logic gates and Boolean algebra. To create complex digital systems, they explore various digital building blocks such as multiplexers, decoders, and arithmetic circuits. The module also covers memory circuits, including different types of memory such as RAM and ROM, and their applications in storing and retrieving digital data. Additionally, students study programmable logic devices (PLDs), versatile integrated circuits that can be programmed to perform specific functions. They learn how to program PLDs and use them in designing digital systems. Through hands-on exercises and projects, students develop practical skills in designing and implementing digital systems, preparing them for real-world applications in computer architecture, communication systems, and embedded systems.</p>			

#### Module 44

Code	Course/Module Title	ECTS	Semester
EE407	Computer Network	6	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	2.5	88.5	61.5
Description			
<p>The Computer Network module comprehensively explores computer networks and their fundamental principles. Students delve into the architecture, protocols, and technologies that drive modern networks. They examine network topologies, routing algorithms, network layers, and security measures. The module encompasses local area networks (LANs) and wide area networks (WANs), covering essentials like Ethernet, TCP/IP, and wireless networks. Hands-on exercises and projects provide practical experience in network configuration, troubleshooting, and management. Network security is emphasized, focusing on securing communications and preventing unauthorized access. By completing the module, students gain a solid understanding of computer networking, empowering them to contribute to designing and maintaining efficient and secure networks in various industries and organizations.</p>			

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