Course Description – Computer Engineering

11100	**Computer Skills (Remedial)**
	Credit Hours: 0
	Introduction to computers: historical, components, functionality. Introduction to computer software and hardware. Programming Languages. Introduction to operating systems. Introduction to word processing with practical applications in preparing homework and reports. Spreadsheets. Computer graphics. Presentation design. Introduction to using Database Management Systems. Using Internet E-mails.
31021	**Arabic Language Communication Skills (Remedial)**
	Credit Hours: 0
	This course aims to develop the student's cognitive abilities in the basics of the Arabic language, through a variety of chosen literary texts, followed by a variety of topics including some simplified grammatical issues. In addition, it focuses on the skill of writing such as spelling, punctuation and the use of the Arabic dictionary, which prepare the student to possess the necessary knowledge, reading, writing, listening and conversation, on which the Arabic language communication skills course is based.
31019	**Arabic Language (Remedial)**
	Credit Hours:0
	This course focuses on the applications that develop the four skills through a set of various tools. The aim is to give students trainings so that they can read loudly and silently, comprehend what they listen to, deepen their abilities to write creatively and functionally, and develop 'speaking' skills.
31022	**English Language Communication Skills (Remedial)**
	Credit Hours: 0
	This course aims at developing the four skills (listening, reading, writing and speaking) and at enabling students to read the different texts and summarize them in their own language as well as guessing the meaning of the word from the context and make predictions before

	reading for main ideas. Since this course is intended for students who are less proficient in the English language, the focus is on giving students the structure of different sentences through the grammar lessons, which in turn enables the student to write correct sentences and thus speak without errors by constructing correct sentences when speaking. Regarding vocabulary, the students will be able to find and use synonyms as well as use context clues to find meaning.
31029	**English Language (Remedial)**
	Credit Hours:0
	This course is offered to students at the intermediate level to develop the students' ability in the four basic skills: reading, writing, speaking and listening. The materials and activities included in the course are designed in such a way to provide practice in these four skills. Therefore, the practice will improve the students' use of English for academic purposes and communication.
31112	**Arabic Language Communication Skills**
	Credit Hours: 3
	This course addresses communication skills in Arabic (Reading, writing, listening and speaking). It focuses on the applications that develop these skills through a set of various basics and tools. The aim is to give students trainings so that they can read loudly and silently, comprehend what they listen to, deepen their abilities to write creatively and functionally, and develop 'speaking' skills through, debate, discussions and critical thinking.
31111	**Arabic Language**
	Credit Hours:3
	This course addresses the communication skills in Arabic (Reading, writing, listening and speaking). It focuses on the applications that develop these skills through a set of various basics and tools. The aim is to give students trainings so that they can read loudly and silently, comprehend what they listen to, deepen their abilities to write creatively and functionally, and develop 'speaking' skills through, debate, discussions and critical thinking.

31122	**English Language Communication Skills**
	Credit Hours: 3
	This course aims at developing students' ability in the four basic skills: (reading, writing, speaking and listening). Practice will improve the students' use of English for academic purposes and communication. The speaking is intended to enable students practice the oral skills and to improve students' pronunciation. Thus, different speaking techniques are undertaken during classes throughout the semester.
31121	**English Language**
	Credit Hours:3
	This course aims at developing students' ability in the four basic skills: (reading, writing, speaking and listening). Practice will improve the students' use of English for academic purposes and communication. The speaking is intended to enable students practice the oral skills and to improve students' pronunciation. Thus, different speaking techniques are undertaken during classes throughout the semester.
31151	**National Education**
	Credit Hours: 3
	This course discusses Jordan: the land, people and homeland, the Arab nation, history of Jordan, political system, Jordanian society, major national institutions, internal and external challenges facing Jordan as well as the role of local institutions in achieving development in national awareness and the family and its role in society.
31160	**Leadership & Societal Responsibility**
	Credit Hours: 0
	This course covers different theoretical and frameworks of leadership, moral leadership, and the philosophical foundations of socially responsible leadership. Further, this course explores the manner in which leaders personally and professionally deal with ethical and social issues as they guide their organizations in such a way to instill and optimize positive social impact.
31162	**Leadership & Societal Responsibility**
	Credit Hours:1

	This course covers different theoretical and frameworks of leadership, moral leadership, and the philosophical foundations of socially responsible leadership. Further, this course explores the manner in which leaders personally and professionally deal with ethical and social issues as they guide their organizations in such a way to instill and optimize positive social impact.
31153	**Introduction to Society, Technology and Environmental Protection**
	Credit Hours:0
	This course aims to inform the student on the issues that are of most concern to him during his university career, and links them to his community and the surrounding environment. These issues include university life and numerous general cultural topics which help to strengthen the student's sense of loyalty and belonging to his university and local community.
31251	**Military Science**
	Credit Hours: 3
	The course is intended to present the history of the Jordanian army, Jordanian peace forces, preparing the nation for defense and liberation, as well as genesis and development of the Hashemite Kingdom of Jordan.
31254	**Entrepreneurship and Innovation**
	Credit Hours: 3
	This course focuses on the behaviour and attributes of entrepreneurs who operate in a competitive environment. It elaborates on the role of entrepreneurs in a competitive market and that of government in the creation of a business environment conducive to entrepreneurship. The course also highlights the relevance of attitudes, values and beliefs to entrepreneurial activity; the management of risks; the process of new product development; and the reasons for the high failure rate of new businesses. Students are expected to prepare a business plan for a new business as their main objective by the end of the semester. The course will develop students' skills and understanding of the risks and rewards of entrepreneurial activities. There will be a special focus on SMEs and entrepreneurship in Jordan.

31256	**Entrepreneurship and Innovation** **Credit Hours:1** This course focuses on the behaviour and attributes of entrepreneurs who operate in a competitive environment. It elaborates on the role of entrepreneurs in a competitive market and that of government in the creation of a business environment conducive to entrepreneurship. The course also highlights the relevance of attitudes, values and beliefs to entrepreneurial activity; the management of risks; the process of new product development; and the reasons for the high failure rate of new businesses. Students are expected to prepare a business plan for a new business as their main objective by the end of the semester. The course will develop students' skills and understanding of the risks and rewards of entrepreneurial activities. There will be a special focus on SMEs and entrepreneurship in Jordan.
31374	**Life Skills** **Credit Hours: 3** This course aims to help students explore and develop the essential skills on a personal and professional level in the age of the Internet, by educating them on how to improve their decision-making process and apply critical/creative thinking to reach ultimate solutions for different situations/problems that they can experience within a business environment. The module is broken into three main categories: Learning Skills, Literacy Skills, and Life Skills. All of which intend to support students in keeping up with the lightning-pace of today's modern marketplace and to better prepare them for the competitive job market they are about to enter.
31375	**Life Skills** **Credit Hours:1** This course aims to help students explore and develop the essential skills on a personal and professional level in the age of the Internet, by educating them on how to improve their decision-making process and apply critical/creative thinking to reach ultimate solutions for different situations/problems that they can experience within a business environment. The module is broken into three main categories: Learning Skills, Literacy Skills, and Life Skills. All

	of which intend to support students in keeping up with the lightning-pace of today's modern marketplace and to better prepare them for the competitive job market they are about to enter.
31255	**Entrepreneurship for Business**
	Credit Hours:3
	This course focuses on the behaviour and attributes of entrepreneurs who operate in a competitive environment. It elaborates on the role of entrepreneurs in a competitive market and that of government in the creation of a business environment conducive to entrepreneurship. The course also highlights the relevance of attitudes, values and beliefs to entrepreneurial activity; the management of risks; the process of new product development; and the reasons for the high failure rate of new businesses. Students are expected to prepare a business plan for a new business as their main objective by the end of the semester. The course will develop students' skills and understanding of the risks and rewards of entrepreneurial activities. There will be a special focus on SMEs and entrepreneurship in Jordan.
31371	**Health Education**
	Credit Hours:3
	This course is an attempt to understand the responsibility we have for our own health, learn skills for dealing with emergency cases, and have personal safety and accident prevention as well as discussing mental health, mental illness and stress.
31372	**Business Skills**
	Credit Hours:3
	Business Skills Subject, Maharat Training for Employability/Maharat Training for Entrepreneurship is implemented over 10-12 weeks that gives Jordanian youth the ideal tools and equips them with the skills required to become productive members of society capable of obtaining jobs as well as becoming successful entrepreneurs. The course is taught using the Maharat methodology, "Learning by Doing" and is conducted within an interactive business-like environment, providing the practical skills necessary for fresh graduates to land successful careers.

31373	**21st Century Skills**
	Credit Hours:3
	This course aims to teach the students the essential skills of the 21st Century Which includes Learning skills, Literacy skills, and Life skills.
20251	**History of Science**
	Credit Hours: 3
	Classification of the Sciences, The Importance of the History of Science, Historical Periodization of Natural Science in the Mediterranean Basin, Epistemological Periodization of Natural Science, Natural Philosophy, Aristotle's Cosmology and Physics, Greek Astronomy, Arabic Astronomy, The Scientific Revolution: Copernicus, Tycho, Gilbert, Kepler, Galileo, Descartes, Newton.
31100	**Sports & Health**
	Credit Hours: 3
	This course addresses the concept of physical education, how it relates to our general concept of education, as well as its objectives and historical development. Also, it examines the different fields and types of contemporary sports education. While studying human anatomy in detail, the course explains the effect of sports activity on different parts of the body, as well as discussing the various elements that contribute to physical fitness. The course presents a number of tests designed to measure different aspects of physical fitness. The course deals with nutrition in terms of basic food groups and the roles they play in the human body, in addition to looking at the most common sports injuries and their symptoms. The course further covers a number of today's diseases such as obesity, anorexia, diabetes and heart disease, concentrating on their causes and how to prevent them.
31130	**Foreign Language**
	Credit Hours: 3
	PSUT offers some foreign languages such as Mandarin (Chinese) course, Spanish, French and other languages to catch up with language skills trend. In each of the languages offered, Students will learn the pronunciation, Common words and some basic but practical grammar,

	such as introduction of oneself, greeting, hoppy, shopping, etc. The Course also covers some basic theoretical principles in the art of translation, qualities of translator, problems involved in translation and analysis of translated texts. The course aims at equipping students with the skills of practical translation from Arabic into English and vice versa. The Course will be mainly applied offering practice in translating a variety of texts from various fields of knowledge: Economy, Politics, Literary texts, Administrations, fashion, Media, Sports etc.
31152	**Arab Islamic Civilization**
	Credit Hours: 3
	Arab-Islamic civilization is considered an extension of Arabs heritage and their history through the successive historical stages and a linked series of Arab history and civilization's rings. It is derived from faith, social cultural and intellectual assets of Islamic Arab society. (Arab Islamic civilization) course stems from Arab and Islamic constant stopped by tolerant Islamic faith, Arab heritage and Arab history and their civilization.
31211	**Arabic literature**
	Credit Hours: 3
	The aim of this course is to developing students' taste of Arabic literature through reading of literature essays, analysis, introducing some literature aspects from different eras, introducing some preliminary concepts such as: literature, text, taste, criticism, realizing the basic steps in processing the literary text, recognizing the literary texts of different genres, such as: poetry, Thoughts, story, Essay, and authors of her book and studying models of literary texts which belong to different periods of time, and analysis and interpretation.
31252	**Governance and Development**
	Credit Hours: 3
	The course covers the basic concepts of governance and development, the nature of the impact associated with the mechanisms of good governance and its indicators on the levels of development in the country. The course highlights the conceptual framework of the concept of good governance and its origins, along with its political, economic, administrative and cultural dimensions; as well as various standards and indicators. The course also covers the

	concept of development and its theories, types and dimensions, with a focus on indicators of sustainable development. The course deals with the nature of the environment created by different forms of government, and the impact on economic growth rates in the long term, and the role of good governance as a link to transforming economic growth into sustainable development by creating an enabling environment for development. It also addresses the role of the system of values and principles associated with good governance, and the complementary roles of its three components (the State, the private sector and civil society), in addition to the pivotal role of the effectiveness of governance in influencing development policies by attracting financial aid, solving the issue of poverty and achieving stability, in a comparative study of the reality of these concepts in developing countries and developed countries.
31257	**Media and Digital Literacy**
	Credit Hours:3
	This course aims to provide students with the knowledge necessary to understand and analyze media messages in their various forms. This course aims to provide students with the knowledge necessary to understand and analyze media messages in their various forms. In addition, it equips them with digital and media skills that enhance critical thinking in evaluating and creating media content. Moreover, it enables them to use media and information sources in a conscious and responsible manner, particularly digital communication tools and social media networks. The course strengthens students' ability to identify and confront unprofessional media messages and practices and harmful and inappropriate media content such as misinformation, disinformation, rumors, and hate speech.
31260	**Human Rights**
	Credit Hours: 3
	The course is an introduction to and a historical overview of human rights and their development. The course also explains the types of human rights and their divisions and applications based on international charters and internal constitutions. It also covers the most

	important guarantees for the application of human rights and public freedoms and the mechanism for their implementation at the national level. The course identifies the existing international and regional instruments that deal with human rights, such as treaties, recommendations, and international means. This course also presents content of human rights such as the right to life, the right to work, and the right of the environment. In addition, it explains the international ways to protect human beings, whether legal methods (reporting system, state and individual complaints, investigation committees) or other methods such as the use of economic and political pressures.
31261	**Introductions to Politics and Economics**
	Credit Hours: 3
	The course addresses the nature of political economy, the issues of political economy, and the importance of the market. Market effects and political economy, three ideologies of political economy, the dynamics of the international political economy, the political economy of structural changes, long-term variations of economic growth and the effect of political hegemonic, the politics of international trade, the political economy of international finance.
31262	**Introduction to Educational Science**
	Credit Hours:3
	This course discusses education principles and philosophy, education and individuals, education and learning, education and society, education and development, educational courses and methods, educational institutions and educational assessments and education in the Arab and Islamic worlds.
31264	**Introduction to Psychology**
	Credit Hours: 3
	The course deals with the concept of psychology, its history, schools, main fields, and research methods. It also deals with the concept of growth, its principles, factors affecting it, and its various stages. The course shows the nature of motivation, the development of its concept, and the classification of motivations. The course focuses on the nature and theories of learning. The course also deals with the concept of intelligence, factors affecting it, and

	methods of measuring it. It also focuses on personality, its theories, and its measurements. The course also deals with some aspects of stress, defense mechanisms, treatment methods and methods of psychological counseling.
31271	**Environmental Science**
	Credit Hours:3
	This course focuses on the basic concepts in ecology; organization, structure and function of ecosystem and ecosystem properties; cycling of matter and flow of energy in ecosystems and their equilibrium; factors involved in the regulation, growth, and general dynamics of populations; data needed to describe populations, population growth, population models, and regulatory mechanisms; spatial and temporal variation and properties of populations; community structure and interactions; succession patterns in aquatic and terrestrial communities.
31272	**Development and Environment**
	Credit Hours: 3
	This course has five different components; introducing learner to the relationship between the environment (natural resources, ecosystem services) and development, the link between environment and development process along with the multiple dimensions of sustainability, analyzing the sustainable development and the approach to achieve the development, environmental quality, and social equity, presenting theoretical perspectives of development and environment and how to achieve its sustainability. The course also gives a comprehensive introduction to all major issues, ways of saving the earth from ecological collapse, as well as defining the roles of sustainable development on the future of humanity.
31311	**Scientific Research Methods**
	Credit Hours: 3
	This course outlines the concept of scientific research including its nature, categories, elements, and procedures. This course also presents a comprehensive introduction to data collection tools, the use of statistical methods in analysis and interpretation, SPSS, the

	generation of findings and recommendations, in addition to the use of libraries, references, and online documentation in preparing academic reports.
31351	**Contemporary Issues in the Arab World**
	Credit Hours: 3
	This course focuses on social and national fragmentation in the Arab east: Features and roots, the Arab-Israeli conflict, democracy and civil society in the Arab world, pan- Arabism and Islam, the self and the other, secularism, the Arabs and globalization and human security in the Arab world.
31352	**Jerusalem: History and facts**
	Credit Hours: 3
	The aim of the course is to address the following topics: the geographic borders of Al-Quds through history, a glance at the historical discoveries in Al-Quds, al-Quds and the British occupation, the establishment of Israel, the Israeli plans to jadeite Al-Quds, importance of Al-Quds from religion point of view, the infringements of Al-Aqsa mosque since 1967 by Israel.
31161	**Introductions to Library Science**
	Credit Hours: 3
	This course discusses how to get to information sources, the types of cataloging, the types of catalogs, types of classification, information and knowledge, information society, information services. Information technology, information storage, information retrieval and dissemination, information and Internet.
31361	**Introduction to Philosophy**
	Credit Hours: 3
	The course tackles the definition of philosophy, the relation between philosophy and science, the science-based and religion-based thoughts, a historical review of philosophy and science, a discussion of the most important fields in philosophy.
31362	**Philosophy and Critical Thinking**
	Credit Hours: 3

	This course aims to build the theoretical mind and philosophical understanding, and to provide the student with thinking skills, including critical thinking. It presents the student with the foundations of philosophical thinking and methods of investigation and logical reasoning. In addition, it introduces to the rules of organized thinking and its procedural, and what it contains of the foundations of the theory of knowledge and access to the formation of mental bases. Furthermore, it equips students with the learning the skills of critiquing scientific texts and evaluating different situations in life to reach correct conclusions and solutions based on the facts and existing data.
20252	**The Arabic-Islamic Scientific Heritage**
	Credit Hours: 3
	Arabs and Muslims as Builders of a Civilization; Ancient Civilizations: Mesopotamia, Egypt, the Greek, the Hindu and Chinese; Transmission of Foreign Literature, Learning, Schools and Learning Resources, Experimenting and Observations; Mathematics and Geometry, Astronomy, Astronomical Instrumentation, Timekeeping and Calendars, Mechanics, Chemistry, Medicine and Pharmacy, Hospitals, Industry, Geography, Aviation, Posting and Communications, Irrigation and Care of Rivers.
11103	**Structured Programming**
	Credit Hours: 3
	Concepts of structured programming. Structured programming languages. Program design, development, running, and testing, and debugging programs. Syntax and semantics of the programming language C++. Basic elements of the language: variables, constants, and data types. Basic input/output functions. Conditional and iterative control structures. Concept of procedural programming, Top/down design. Structured decomposition. Functions and parameter passing. Recursive functions. Pointers and dynamic variables. Basic data structures: one and two-dimensional arrays, string manipulation, structures. Input / Output Files, Concepts of OOP and Classes.
11151	**Structured Programming Lab**
	Credit Hours: 1

	Laboratory sessions on the different aspects and topics of the structured programming using C++.
20132	**Calculus (1)**
	Credit Hours: 3
	Functions and Their Graphs, Combining Functions, Shifting and Scaling, Trigonometric Functions, Exponential Functions, Inverse Functions and Logarithms, Inverse Trigonometric Functions, Tangents to Curves, Limits of a Function and Limit Laws, Continuity, The Intermediate Value Theorem, Limits Involving Infinity, Asymptotes, Tangents and Derivatives at a Point, The Derivative as a Function, Differentiation Rules, Derivatives of Trigonometric Functions, The Chain Rule, Implicit Differentiation, Derivatives of Inverse Functions and Logarithms, Derivatives of Inverse Trigonometric Functions, Extreme Values of Functions, Rolle's Theorem, The Mean Value Theorem, Monotonic Functions and The First Derivative, Concavity and Inflection Points, Curve Sketching, Indeterminate Forms and L'Hopital's Rule, Antiderivatives, Definite Integrals, The Fundamental Theorem of Calculus, Indefinite Integrals and the Substitution Method, Applications of Definite Integrals: Area Between Curves, Volumes of solids: Slicing Method, Disc Method, Washer Method, and Cylindrical Shell Method.
20133	**Calculus (2)**
	Credit Hours: 3
	Hyperbolic Functions, Integration of Transcendental Functions, Techniques of Integration: Integration by Substitution (Review), Integration by Parts, Integration Including Powers of Trigonometric Functions, Integration by Trigonometric Substitution, Partial Fractions, Other Techniques, Improper Integrals, Sequences, Limit of Sequence; Series: Convergent and Divergent Series; Series Tests for Convergence: Partial Sums, Telescoping Series, Geometric Series, Base Divergence Test, Integral Test, P-series Test, Ratio Test, Root Test, Absolute Convergence Test, Alternating Series Test, Conditional Convergence; Power Series and Taylor series, Interval and Radius of Convergence, Parametric Equations of Curves in Plane, Polar Coordinates, Graphs in Polar Coordinates.

20140	**Basic Concepts in Chemistry**
	Credit Hours: 1
	Matter and Measurements; Atoms, Molecules, and Ions; The Periodic Table; Ions and Ionic Compounds; Stoichiometry: Calculations with Chemical Formula and Equations; Avogadro's Number and the Mole; Basic Concepts of Chemical Bonding; Gases: Pressure, The Gas Laws, and the Ideal-Gas Equation.
20141	**Physics (1)**
	Credit Hours: 3
	Physics and Measurement, Motion in One Dimension, Vectors, Motion in Two and Three Dimensions, Newton's Laws of Motion, Circular Motion and Other Applications of Newton`s Laws, Work and Energy, Conservation of Energy, Conservation of Linear Momentum and Collisions, Rotational Motion.
20142	**Physics (2)**
	Credit Hours: 3
	Electric Fields, Gauss's Law, Electric Potential, Capacitance and Dielectrics, Current and Resistance, Direct-Current Circuits, Magnetic Fields, Sources of Magnetic Fields, Faraday's Law, Inductance.
20150	**Physics Lab**
	Credit Hours: 1
	Basic Measurements and Introduction to Errors and Graphs, Static Equilibrium, The Laws of Motion, Ohm's Law, Resistance and Resistivity, Power Transfer, Wheatstone Bridge, Kirchhoff's Rules, RC-circuits, AC Circuits: RC- and RL-Circuits.
20148	**Physics (1) Lab**
	Credit Hours: 1
	Introduction to Errors and Graphs, Basic Measurements, Static Equilibrium, The Laws of Motion, Simple Harmonic Motion, Moment of Inertia, Viscosity.

20149	**Physics (2) Lab**
	Credit Hours: 1
	Ohm's Law, Resistance and Resistivity, Power Transfer, Wheatstone Bridge, Kirchhoff's Rules, RC-circuits; AC Circuits: AC-Waveforms, RC- and RL-Circuits, RLC Series Resonance Circuit.
20200	**Technical Writing & Communication Skills**
	Credit Hours: 3
	Engineering and Writing: Controlling the Writing System. Letters, Email, and Other Media for Engineers. Writing Style for Business Correspondence, Communication Strategies for Tricky Situations, Business Letters, Email, New Internet Media. Writing Common Engineering Documents: Research, Laboratory, and Field Reports, Specifications, Proposals, Progress Reports, Instructions, Recommendation Reports. Writing Research Paper and Design Reports. Constructing Engineering Tables and Graphics: Tables, Charts and Graphs, Illustrations, Graphics and Tables (Guidelines). Engineering Your Speaking: Preparing The Presentation, Delivering the Presentation. Writing to Get an Engineering Job: Engineering Resume, Application Letter, Follow-Up Letter. Engineering Your Online Reputation: Introduction to Social Media Management.
20231	**Calculus (3)**
	Credit Hours: 3
	Three Dimensional Coordinate System, Vectors, Dot and Cross Products, Lines and Planes in Space, Cylindrical and Quadric Surfaces, Curves in Space and Their Tangents, Integral of Vector Functions, Arc Length in Space, Curvature and Normal vectors of A Curve, Tangential and Normal Components of Acceleration, Velocity and Acceleration in Polar Coordinates, Functions of Several Variables, Limits and Continuity in Higher Dimensions, Partial and Directional Derivatives, Chain Rule, Gradient Vector, Tangent planes and Normal lines of Surfaces in Space, Differentials, Extreme values and Saddle Points, Lagrange Multipliers, Double Integrals in Cartesian and Polar Coordinates, Triple integrals in Cartesian, Cylindrical and Spherical Coordinates.

21218	**Engineering Drawing Lab**
	Credit Hours: 1
	Introduction to engineering drawing and AutoCAD software. Setting up drawing parameters. Coordinates entry. Object snap. Basic editing techniques. Blocks. Multi-lines. Polylines. Spline. Layers. Dimensions. Orthographic projection. Auxiliary views. Sections. Three-dimensional pictorials. Editing solids and 3-D operations. Boolean Operations.
21219	**Engineering Workshop**
	Credit Hours: 1
	Industrial and personal safety at site, basic electrical components and instruments. Electrical wiring and printed circuit boards. Covers the design thinking methodology to identify and address engineering problems. Includes solid modeling, rapid prototyping, understanding end users, their unarticulated needs, and creating alternative solutions. Focus on creativity, identify potential solutions, and innovation of new products and work processes.
21318	**Computer-Aided Engineering Design Workshop**
	Credit Hours: 1
	This laboratory course provides hands-on experience in the design, fabrication, assembly, and testing of printed circuit boards (PCBs). Students will learn to use modern EDA tools to design schematics and layouts, generate manufacturing files (Gerber), and fabricate PCBs using CNC milling, photolithography, and toner transfer techniques. The course also covers through-hole (THT) and surface-mount (SMD) soldering, rework techniques, and circuit debugging using standard laboratory instruments. By the end of the course, students will be able to develop complete PCB-based systems from concept to working prototype, following Design for Manufacturing (DFM) and safety practices.
24411	**Engineering Ethics**
	Credit Hours: 1
	Safety and responsibility. Professional responsibility to customers and to employers. Blowing the whistle. Codes of ethics and honor. Professional choices. Legal obligations. Standard ethics

	theories. Case studies. Responsible AI development. Social Impact of AI technologies. National Code of Ethics for Artificial Intelligence: Principles and Guidelines.
27401	**Industry Apprenticeship Practicum**
	Credit Hours: 3
	The industry apprenticeship practicum course aims to prepare students to acquire the essential skills and knowledge required to succeed in engineering workplace environments and field training. The course covers topics related to effective communication, teamwork, professional ethics, understanding labor market requirements, and career pathway planning through resume preparation, readiness for job interviews, and dealing with workplace expectations. It also introduces students to the impact of modern digital technologies on engineering practice. It further focuses on strengthening practical and discipline-specific skills related to the engineering workplace through applied activities and real-life case studies, in collaboration with industry experts, in order to provide a learning experience aligned with current market needs. The course aims to build students' professional readiness and help them understand their roles and responsibilities in the workplace, thereby enhancing their ability to perform efficiently and confidently in diverse professional environments.
27411	**Engineering Economics**
	Credit Hours: 3
	Cost concepts, decision-making process, concepts of time value of money, simple and compound interest, interest formulas, rate of return, cash flow, project evaluation methods, break-even analysis, evaluating a single project, comparison and selection among alternatives and depreciation calculations.
27412	**Engineering Economics and Digital Applications**
	Credit Hours: 3
	This course offers a comprehensive study of the principles and fundamental concepts of engineering economics, with a focus on the applications of modern digital technologies in the engineering field. It covers cost concepts, engineering decision-making processes, the time value of money, methods for evaluating engineering projects, and depreciation calculations.

	The course also emphasizes how digital technologies, such as automation, cloud computing, and the Internet of Things (IoT), can be used to enhance the economic analysis of engineering projects, reduce costs, increase efficiency, and improve investment decision-making. Furthermore, it examines the impact of digital transformation on economic feasibility assessment, risk management, and improved financial performance of engineering projects, while maintaining a balance between the economic and practical aspects of digital technologies.
11206	**Object Oriented Programming**
	Credit Hours: 3
	Object oriented programming concepts and paradigms. Review of control structures, data types, functions, arrays and pointers. Data abstraction. Encapsulation and information hiding. Classes attributes and methods. Inheritance. Overloading. Polymorphism. Templates.
11212	**Data Structures and Introduction to Algorithms**
	Credit Hours: 3
	Basics of algorithm design and analysis. Asymptotic analysis of upper and average complexity bounds: best, average, and worst-case behaviors. Big "O" notation. Searching and sorting algorithms. Recursion. Data abstraction and review of object-oriented concepts. Basic data structures. Sequential and linked representation of data structures. List, Ordered List, Sets, Stack, Queue, tree, Binary trees, graph and network.
11253	**Object Oriented Programming Lab**
	Credit Hours: 1
	Laboratory sessions on the different aspects and topics of object-oriented programming.
11313	**Algorithm Design and Analysis**
	Credit Hours: 3
	Formal techniques of the design and analysis of algorithms. Asymptotic analysis of upper and average complexity bounds. Empirical measurements of performance; time and space tradeoffs in algorithms. Correctness and finiteness of algorithms. Algorithmic strategies: Brute-force, greedy, divide-and-conquer, backtracking, branch-and-bound, heuristics, pattern

	matching and string/text algorithms. Implementation strategies for Graph, Network and Tree algorithms.
11323	**Database Systems**
	Credit Hours: 3
	Basic concepts of databases. DBMS components. Transaction managements. Data modeling. Entity relationships diagrams. Relational databases. Database integrity constraints. Relational Algebra. Query languages. Dependencies, schema designs normalization and redundancy elimination.
20134	**Discrete Math (1)**
	Credit Hours: 3
	Propositional Logic, Propositional Equivalences, Predicates and Quantifiers, Rules of Inference, Proof Methods, Sets and Their Operations, Functions, Cardinality of Sets, Sequences and Summations, Matrices, Mathematical Induction, Solving Linear Recurrence Relations, Relations and Their Properties, Graphs and Graph Models, Graph Terminology and Special Types of Graphs.
20232	**Engineering Mathematics (1)**
	Credit Hours: 3
	Basic Concepts and Ideas of ODEs, First-order Differential Equations, Separable Equations, Exact Equations, Linear and Bernoulli Equations, Second-order and higher order ODEs, Homogeneous Equations with Constant Coefficients, Complex Roots, Euler-Cauchy Equation, Wronskian, Non-homogeneous Equations, Undetermined Coefficients, Variation of Parameters, Power Series Method, Theory of Power Series, Frobenius Method, Laplace Transforms and Tables, Applying Laplace Transforms to Solve ODEs, Convolution, Vectors and Matrices, Homogeneous Systems of ODEs, Nonhomogeneous Systems of ODEs, Solving Systems Using Eigenvalues and Laplace Transform.
20234	**Linear Algebra**
	Credit Hours: 3

	System of Linear Equations: Row-echelon Form, Gaussian Elimination, Gauss-Jordan Method; Matrix: Operations, Properties of Matrix Arithmetic, Matrix Transpose, Special Matrices; Determinants: Properties of Determinants, The Method of Cofactors, Adjoint Matrix and Inverse of a Matrix, Cramer's Rule; Euclidean n-space: Vectors, Dot Product, Cross Product, Euclidean n-space, Linear Transformations; Vector Spaces: Vector Spaces, Subspaces, Span, Basis and Dimensions, Fundamental Subspaces, Inner Product Spaces, Orthogonal and Orthonormal Basis, Least Squares, QR- decomposition, Orthogonal Matrices; Eigenvalues and Eigenvectors: Eigenvalues and Eigenvectors, Diagonalization. Linear Transformations: General Linear Transformations, Kernel and Range.
20333	**Numerical Analysis**
	Credit Hours: 3
	Error Analysis, Iterative Methods for Solving Linear and Nonlinear Equations of One Variable, System of Linear Algebraic Equations, Direct Methods for Solving Linear Systems, Iterative Methods for Solving Linear and Nonlinear Systems of Equations, Interpolation and Approximation, Introduction to Numerical Differentiation and Integration, Numerical Methods for Solving Initial Value Problem.
20334	**Applied Probability**
	Credit Hours: 3
	Probability principles and set theory. Random variables. Operations on random variables. Various distribution functions. Introduction to random processes. Weak stationary. Correlation functions, linear processing, and estimation. Poisson processes and Markov chains. Queuing analysis.
20335	**Applied Probability and Statistics**
	Credit Hours: 3
	Introduction to Descriptive Statistics: Measures of Central Tendency, Measures of Dispersion, Measures of Position, and Graphical and Tabular Displays; Introduction to Inferential Statistics: Point Estimate, Confidence Interval and Hypothesis Testing; Basic Probability and Set Theory, Conditional Probability and Independence, Random Variables and Moments,

	Special Probability Distributions (Discrete and Continuous Distributions), Multiple Random Variables, Covariance and Correlation Coefficient, Functions of Random Variables, Transforms and Moment Generating Function, Practical Applications.
21221	**Electric Circuits (1)**
	Credit Hours: 3
	Types of circuits and circuit elements. Revision of Ohm's and Kirchhoff's Laws. Circuit analysis techniques: voltage and current division, nodal and mesh analysis, source transformation, superposition, Thevenin's and Norton's theorems. Inductance and capacitance. Source-free RL and RC circuits. Applications of the step forcing function. The RLC circuit: source-free parallel and series RLC and complete response. Sinusoidal forcing function. Phasor concept.
21222	**Electric Circuits (2)**
	Credit Hours: 3
	The sinusoidal steady state response: application of phasor concept and circuit analysis techniques AC circuits. Average power and RMS values. Types of Electrical Machines. Poly-phase circuits: three phase (Y) and (Δ) connection. Complex frequency. Frequency response and Bode plot. Magnetically coupled circuits. Two-port networks.
21229	**Electric Circuits Lab**
	Credit Hours: 1
	DC circuit: Kirchhoff's laws and mesh analysis. Thevenin's and Norton's theorems. Superposition theorem. Wheatstone bridge. Transient response: RL, RC, and RLC circuits. AC circuits: impedance concept, frequency response, three-phase circuits. Y- Δ transformation. Maximum power transfer. Two-port networks.
21231	**Electronics (1)**
	Credit Hours: 3
	Basic semiconductor concepts. Diodes: DC and AC analysis, special type diodes. Theory of Bipolar Junction Transistors (BJT): biasing techniques, BJT amplifier analysis. Field Effect Transistors (FET): biasing techniques, FET amplifier. Simple applications of BJT's and FET's.

21331	**Electronics (2)**
	Credit Hours: 3
	Operational amplifiers: basic theory, characteristics and applications. BJT and MOSFET current mirrors. Differential and multistage amplifiers. Frequency response of single and multistage BJT and CMOS amplifiers. Negative feedback analysis: feedback topology, properties and stability analysis. Operational amplifier design and simulations project.
21332	**Digital Electronics**
	Credit Hours: 3
	Introduction to logic families: Resistor Transistor Logic (RTL), Transistor-Transistor Logic (TTL), Emitter-Coupled Logic (ECL), Complementary Metal-Oxide Semiconductor logic (CMOS), and BiCMOS. Introduction to CMOS fabrication and layout concepts. Sequential circuits (latches and flip-flops) and memories (SRAM, DRAM, ROM). Analog to digital converter and digital to analog converter. Multivibrator and Schmitt trigger circuits and application.
21338	**Electronics Lab**
	Credit Hours: 1
	Diode characteristics and applications. BJT characteristics and DC biasing. FET characteristics and DC biasing. BJT amplifiers. Operational amplifiers. Multistage amplifiers. Differential amplifiers. Frequency response. Feedback techniques.
21339	**Digital Electronics Lab**
	Credit Hours: 1
	Basic RTL and TTL Logic Design and characteristics. Basic MOS logic circuits and characteristics. Dynamic logic gates. Oscillators, A/D and D/A converters. Introduction to Hardware Description Language (HDL).
22210	**Programming Applications Lab**
	Credit Hours: 1
	The course provides an introduction to the MATLAB computing environment and gives students a basic understanding of MATLAB programming and popular Simulink toolboxes. It

	covers basic commands in MatLab, such as arithmetic operations, arrays, loops, logic control, and data types and format. It also covers various applications in engineering including control, signal processing, and others using Simulink toolboxes. The course is offered in the form of laboratory sessions (theory and experiments).
23356	**Programming Applications in Signals & Systems Lab**
	Credit Hours: 1
	Introduction to MATLAB. The MATLAB based experiments cover the following topics: Linear time invariant systems (LTI), frequency domain representation of signals and systems, and design and analysis of Filters. Practical applications will be given along with the lab experiments.
23352	**Programming Applications in Signals and Systems**
	Credit Hours: 1
	Introduction to MATLAB. Using MATLAB in signals and systems. Signal generation and the convolution process. Fourier series. Laplace and Fourier transforms. Transient and steady state response. Filter design. Discrete signals: Z- transform and frequency domain analysis.
22241	**Digital Logic Design**
	Credit Hours: 3
	Number systems. Basic gates and logic functions. Boolean algebra, Boolean expressions. Logic minimization techniques. Combinational logic building blocks: decoders, encoders, multiplexers, demultiplexers and magnitude comparators. Digital arithmetic: adders and subtractors. Basics of sequential circuits: latches and flip-flops. Timing diagrams. Counters and shift registers. Basic PLDs, CPLDs and FPGAs. State machines. System design with state machines using HDL. Memory devices and systems: RAM, ROM, FIFO, LIFO and DRAM.
22271	**Artificial Intelligence & Data Analytics in Engineering**
	Credit Hours: 3
	This course provides a comprehensive introduction to the fundamental principles, methodologies, and tools driving data science and Artificial Intelligence (AI). It introduces a core programming language and its principal libraries for data manipulation and AI

	applications, while guiding students through the main stages of the data pipeline, including data preprocessing, sampling, exploratory data analysis, feature engineering, and visualization techniques. Building on this analytical foundation, the course explores core machine learning concepts and provides students with a solid understanding of supervised and unsupervised learning algorithms.
22320	**Computer Architecture (1)**
	Credit Hours: 3
	Register transfer & micro-operations. Design of arithmetic logic unit. Computer Instructions. Number representations and computer arithmetic. Computer organization and components. Processor design: data-path and control units. Instruction cycle. Pipelining.
22444	**Computer Architecture & Organization (1)**
	Credit Hours: 3
	Register transfer & microoperations. Design of arithmetic logic unit. Computer Instructions. Number representations and computer arithmetic. Computer organization and components. Processor design: datapath and control units. Instruction cycle. Pipelining.
22321	**Computer Architecture (2)**
	Credit Hours: 3
	Technology trends. Computer performance: CPU time equation, benchmarks, die cost, power and Amdahl's law. Instruction-level parallelism: pipeline review, pipeline hazards, superscalar processors, static multiple issue, VLIW, dynamic scheduling, speculative execution and branch prediction. Memory hierarchy: caches, cache performance, advanced cache designs, memory organization and virtual memory. Storage and I/O: performance, disk storage, flash storage, system and I/O busses and RAID. Parallel computers: shared-memory multiprocessors, coherence protocols, NUMA, message passing, clusters, multithreading and multicore processors.
22540	**Computer Architecture and Organization (2)**
	Credit Hours: 3

	Technology trends. Computer performance: CPU time equation, benchmarks, die cost, power and Amdahl's law. Instruction-level parallelism: pipeline review, pipeline hazards, superscalar processors, static multiple issue, VLIW, dynamic scheduling, speculative execution and branch prediction. Memory hierarchy: caches, cache performance, advanced cache designs, memory organization and virtual memory. Storage and I/O: performance, disk storage, flash storage, system and I/O busses and RAID. Parallel computers: shared-memory multiprocessors, coherence protocols, NUMA, message passing, clusters, multithreading and multicore processors.
22344	**Microprocessors**
	Credit Hours: 3
	Assembly language instruction set. Addressing modes. Arithmetic instructions. Logical and bit manipulating instruction. I/O instructions. Microprocessor pin out and timing diagram. Address decoding circuits. Memory interfacing. Input output interfacing. Serial and parallel communications. Counter and timers. Interrupts. DMA controllers.
22447	**Microprocessor Lab**
	Credit Hours: 1
	Software development using PC assembly language. Implementation of simple I/O interfacing circuits. Keyboard and 7-segment displays scanning. A simple interfacing circuit project.
22348	**Digital Logic Lab**
	Credit Hours: 1
	This lab introduces students to the fundamentals of designing and building digital circuits using hardware ICs as well as HDL. The lab includes an introduction HDL, and focuses on building combinational circuits such as parallel adder, multiplexers and decoders using HDL and hardware components. While the second part of the lab deals with building sequential circuits in hardware and describing them in HDL using behavioral modeling.
22420 22548	**Computer Design Lab**
	Credit Hours: 1

	Digital systems design, simulation and FPGA implementation using HDL Languages. Finite State Machines. Implementing algorithms in hardware. Introduction to the development of dedicated embedded systems based on soft processors using high-level programming languages.
22442	**Embedded Systems**
	Credit Hours: 3
	Embedded systems characteristics. Microprocessors versus microcontrollers. Microcontrollers characteristics. General-purpose microcontrollers. Examples of microcontroller architectures. Interrupts. Counters/timers. Input/output ports. Microcontroller programming. Instruction set. Program development and use of assemblers. Memory maps and addressing modes. Digital to analogue and analogue to digital conversion in microcontrollers. Data acquisition and distribution. Serial and parallel communications. Real-time systems and its constraints. Interfacing to external devices. Power consumption consideration. Applications.
22443	**Computer Networks**
	Credit Hours: 3
	Introduction to computer networks and the Internet. Protocol layers and the OSI model. Application layer: HTTP, FTP, SMTP, POP3, DNS and peer-to-peer applications. Transport layer: UDP, TCP and congestion control. Network layer: virtual circuits, routers, IP protocols and routing algorithms. Link layer: error detection and correction, multiple access, MAC addressing, switches, ARP, Ethernet, PPP, local area networks and wide area networks. Wireless and mobile networks. Security in computer networks.
22448	**Embedded Systems Lab**
	Credit Hours: 1
	Advances in Microcontroller-Based Embedded Systems and Microcontrollers, Model-Based Embedded Software Design, Auto-code generation and Rapid Prototyping. Interfacing Digital, Analog and Serial Communication peripherals and devices.
22449	**Computer Networks Lab**
	Credit Hours: 1

	Router and switch basic configuration and security management. Routing protocols configuration. VLANs and VLAN routing mechanisms. Natting, and DHCP configuration and management. Leased lines configuration and security management. Utilizing IPv6 and implementing IPv6 routing protocols.
22445	**Computer Networks Lab (1)**
	Credit Hours: 1
	Setting up the PC and configuring the NIC. Establishing a LAN. Routers and network tools. Router configuration and router protocols. Securing networks using routers. Configuring switches. Network address conversion. Introduction to wireless networks and configuration.
22547	**Computer Networks Lab (2)**
	Credit Hours: 1
	Wireless networks topologies. Ad hoc wireless connections. Wireless access points. Wired and wireless networks security and management. SSH protocol. Authentication and AAA system. Radius and TACACS systems. Authentication proxies. Access control list. Private virtual networks. Firewall.
22460	**Operating Systems and Security**
	Credit Hours: 3
	This course focuses on the foundational aspects of operating system architecture. Key concepts covered include process handling, memory segmentation, deadlocks, virtualization, file systems, scheduling algorithms, inter-process communication, memory management, and I/O handling. While an overview of system security will be provided, illustrating the importance of robust system design, the primary emphasis of the course lies in understanding the principles and mechanisms that underlie modern operating systems.
22461	**Operating Systems and Security Lab**
	Credit Hours: 1
	This lab emphasizes on applying the principles and concepts of operating systems. It also emphasis on discovering and exploiting the vulnerabilities of the standard operating systems.

	Additionally, the lab focuses on using tools and techniques to decrease risks arising from vulnerabilities in Microsoft Windows operating systems, Linux and Android.
22462	**Operating systems Lab**
	Credit Hours: 1
	This Lab is designed to explore the practical and theoretical aspects of operating systems, providing a broad and comprehensive understanding of architectural design, command-line functionality, user permissions, and system configurations. Through hands-on laboratory exercises, students will gain experience with core concepts that are applicable across different platforms. While the emphasis of the lab is on the fundamental principles of operating systems, some attention will be given to basic security considerations, though in a less prominent manner. Application of the above principles will be done on one of the following platforms: Linux, Windows, or Android.
22490	**Practical Training**
	Credit Hours: 3
	Students undertake suitable and supervised internships for a period of 8 consecutive weeks in Jordan, or 6 consecutive weeks outside.
22560	**Network Programming and Applications**
	Credit Hours: 3
	Introduction to Network Programming, Transport Layer Protocols, TCP, UDP, and SCTP, Client-Server Model, TCP Sockets, UDP Sockets, SCTP Sockets, I/O Multiplexing, DNS and Address Conversion, Threads Programming, RPC, Raw Sockets and Data link Access. One or more of the following Internet Application Protocols and Case Studies: TELNET, HTTP, SMTP, POP, IMAP, FTP, and Web Programming (CGI, Servlets, and XML).
22568	**Network Applications Development**
	Credit Hours: 1
	Introduction to Network Programming and Protocols, the Client-Server Model, socket programming, I/O Multiplexing, DNS and Address Conversion, Threads Programming, RPC,

	and Data link Access. One or more of the Internet Application Protocols and Web Programming.
22570	**Artificial intelligence and Machine Learning**
	Credit Hours: 3
	This course consists of two parts; the first part of the course covers the fundamentals of AI, and techniques like Fuzzy logic, evolutionary algorithm, and Neural Networks. The second focuses on machine learning techniques; supervised learning, unsupervised learning, recommender systems, and deep learning.
22572	**Machine Learning & Artificial Intelligence**
	Credit Hours: 3
	This course provides a detailed exploration of supervised and unsupervised machine learning algorithms, before progressing to advanced techniques such as dimensionality reduction, regularization, and ensemble learning. Building on this foundation, the course introduces fundamental neural network architectures, including convolutional and recurrent neural networks. It concludes with an examination of broader AI techniques such as fuzzy logic and evolutionary algorithms.
22591	**Senior Design Project (1)**
	Credit Hours: 1
	Projects are aimed at developing independent engineering problem solving skills. A project should be performed by two or more students under the supervision of a faculty member.
22592	**Senior Design Project (2)**
	Credit Hours: 2
	Continuation of Senior Design Project (1). Students are required to fulfill the project objectives, perform a formal presentation and submit a final report.
24301	**Modeling & Simulation in Engineering Applications**
	Credit Hours: 3

	This course introduces fundamental modeling and simulation methodologies. It equips students with the practical skills and techniques required to represent, analyze, and evaluate the behavior of various systems. Topics include mathematical modeling of dynamic systems using differential equations and state-space representations, and frequency-domain analysis. The course also covers the development of physics-based simulation models, fuzzy system modeling as well as numerical modeling techniques for solving complex problems. Through simulation-based studies and practical applications, students gain experience in predicting system behavior, validating designs, and evaluating solutions under realistic operating conditions using engineering simulation tools.
24401	**Engineering Innovation & Tech Entrepreneurship**
	Credit Hours: 3
	This course aims to develop students' knowledge, competencies, and practical skills in engineering innovation and technology entrepreneurship. The course covers a range of key topics, including the foundations of innovation and technology entrepreneurship, idea generation and development, multidisciplinary teamwork, market and customer analysis, business model design, business planning, intellectual property fundamentals, startup financing, prototype development, and the marketing and professional pitching of technology-based projects to relevant stakeholders.
24471	**Automatic Control**
	Credit Hours: 3
	Transfer Functions: block diagrams and signal flow graphs. Mathematical modeling of physical systems. State space representations. Control systems characteristics. Time response of systems and closed loop performance of second order systems. Stability and Routh-Hurwitz stability criterion. Root locus analysis. Nyqist stability criterion. Bode plots. Frequency domain analysis. Design of control systems.
24479	**Automatic Control Lab**
	Credit Hours: 1

	A set of experiments that cover the following: analog simulation, first and second order systems, transient and steady state for step, ramp, and parabolic inputs. Time and frequency response of second order systems. DC motor control. Application of PID controller, phase-lead, and phase-lag controllers. Level control. Applications using simulation software.
25330	**Information Security Fundamentals**
	Credit Hours: 3
	This course covers the use of basic computer security mechanisms, authentication, access control, policy types. The course introduces firewalls, network intrusion detection, Viruses, Worms, Trojan horses, and other forms of malicious code. Coverage of the IT security management process: asset identification and valuation, determining threats to assets and their vulnerabilities, prioritizing and selecting countermeasures, implementing and deploying countermeasures, and continuing maintenance and assessment of security mechanisms. Design and use of basic network security mechanisms.
27353 23351	**Signals and Systems**
	Credit Hours: 3
	Classification of signals and systems. System modeling and time domain analysis. The Fourier series, the Fourier transform, and Laplace transform and applications. Frequency response and filter concepts. Signal transmission. Spectral analysis. Discrete- time signals and systems: classification of signals and systems. The Z-Transform and applications.
27355 23355	**Communication Principles**
	Credit Hours: 3
	Transmission through a Linear System. Amplitude, Frequency and Phase Modulation and Demodulation. Sampling Theorem, A/D conversion, Line Coding and M-ary. Baseband Transmission: PAM, PPM, PWM, PCM. Multiplexing Techniques: TDM, FDM and CDM. Digital Modulation and Demodulation Techniques: QAM, ASK, PSK and FSK.
23459	**Communications Lab**
	Credit Hours: 1

	Spectral analysis. Amplitude modulation. Frequency modulation: phase shift keying, amplitude shift keying, frequency shift keying. TDMA. FDMA. Lab project.
24321	**Applied Electromagnetics**
	Credit Hours: 3
	Gauss' law. Divergence Theorem. Ampere's law. Biot-Savart law. Maxwell's equations and boundary conditions. Electromagnetic waves. Wave equations. Solutions in Cartesian coordinates. Solutions for partially conducting, good conducting and perfect dielectric mediums. Standing waves. Power and Poynting vector. Transmission lines, parameters, equations, input impedance, Standing Wave Ratio (SWR), power and Smith chart.
12446	**Digital Image Processing**
	Credit Hours: 3
	Human vision system. Cameras and display systems. Image formation, representation and digitization. Image restoration techniques: gray-scale and color modification, Linear filter techniques for noise suppression and edge enhancement, non-linear filter techniques. Lossless and Lossy compression techniques. Image analysis: segmentation and edge detection, shape descriptors. Frequency domain analysis. Image interpretation. Object detection. Pattern recognition. OCR. Biometrics techniques. Neural network. The course covers theory and practical aspect
13477 11425	**Software Engineering**
	Credit Hours: 3
	This course aims to introduce the fundamentals of software engineering. Topics include software development 'life cycle' including requirements, design and testing, development strategies, prototyping, formal methods, test case, documentation, program efficiency and debugging, object-oriented analysis and design, software quality assurance, metrics reusability and reliability.
21471	**Robotic Systems**
	Credit Hours: 3

	This course introduces the fundamental principles of modern robotics, focusing on the mathematical, mechanical, and computational foundations required to analyze and control robotic systems. Students explore manipulator anatomy, spatial transformations, Denavit–Hartenberg and product of exponential (POE) modeling, and forward and inverse kinematics. The course progresses to differential kinematics, Jacobians, robot dynamics, classical and advanced control methods, mobile robot models, path planning, and trajectory generation. Throughout the semester, students connect theory to real-world applications and basic robot programming, forming a solid foundation for more advanced robotics courses.
21531	**Very Large Scale Integrated (VLSI) Circuits**
	Credit Hours: 3
	This course covers advanced topics in very-large-scale integrated (VLSI) circuit design, with emphasis on the analysis, implementation, and verification of modern digital integrated systems. Topics include nonideal transistor behavior, logical effort, wires and scaling effects, and common design pitfalls and reliability issues in nanoscale technologies. The course also introduces SystemVerilog and RTL design, verification basics, and logic synthesis as essential components of contemporary digital design flow. Additional topics include datapath design, system-level timing analysis, and design for testability (DFT). The course emphasizes the relationship between circuit theory, digital design methodology, and practical implementation considerations, and prepares students for advanced work in VLSI system design and verification.
21581	**Special Topics in Electronics Engineering**
	Credit Hours: 3
	The objective of this course is to introduce advanced and new topics in one of the areas of electronics engineering. The topics can be changed from one year to another depending on the instructor's area of specialty.
22466	**Mobile Application Programming**
	Credit Hours: 3

	This course discusses mobile application programming for mobile devices such as smart phones, tablets, and pads. The course focuses on developing mobile platform will be introduced. A specific programming language along with the necessary libraries of reusable software components of a mobile platform will be introduced. This course explores the key theories, principles, concepts, tools current issues, and best practices of designing and developing applications for mobile devices. Upon course completion, students are expected to produce an innovative mobile solution for a real life situation.
22521	**High-Performance Computing**
	Credit Hours: 3
	Fundamentals of high-performance computing (HPC). Parallel architectures, algorithms, and software tools. Performance modeling and enhancement. Message-passing and multi-threaded programming. Parallel Algorithms and Applications.
22522	**Introduction to Quantum Computing**
	Credit Hours: 3
	Brief history of quantum computation and quantum information. Postulates of quantum theory. Qubit model. Quantum gates and circuits. Quantum entanglement. Quantum teleportation. Quantum algorithms. Quantum error correction. Quantum cryptography. Realization of quantum computers.
22530	**Software Reverse Engineering**
	Credit Hours: 3
	This course introduces the students the principles and concepts of Software Reverse Engineering. The course places emphasis on reversing and analyzing the binary file of both Microsoft Windows and Linux operating systems in order to review, assess and exploit the software. The course also covers Reverse Engineering ethics, basic and advanced malware analysis, copyright protection, and anti-reversing techniques.
22542	**Advanced Computer Networks**
	Credit Hours: 3

	Review of the OSI reference model. Logical link control. HDLC. Multiplexing. WANs. ATM. Frame relay. Ethernet LANs and VLANs. Wireless LANs.
22543	**Digital System Design**
	Credit Hours: 3
	Modern design methodology: register transfer level modeling (RTL), algorithmic state machines (ASMs), introduction to hardware description languages (Verilog), system-level modeling and simulation, use of hardware description languages to implement hybrid sequential and combinational designs. Design and implementation of significant digital designs using representative Computer Aided Design (CAD) tools.
22546	**Network Management and Security**
	Credit Hours: 3
	Network management overview. Security policy and procedures. Cryptography and its application to network security. Authentication. Intrusion detection and prevention. Securing E-Commerce systems. Web security. Firewalls security implementation. Application of security tools. Wireless security technologies. Disaster recovery and continuation of E-Business functions.
22571	**Advanced Machine Learning**
	Credit Hours: 3
	This course aims to introduce students to state-of-the-art topics in machine learning. The course includes advanced neural networks architectures. Furthermore, it covers other learning methodologies like Reinforcement learning, transformers and autoencoders. The course also covers any modern topics or techniques in the field of machine learning.
22581	**Special Topics in Computer Engineering**
	Credit Hours: 3
	The objective of this course is to introduce advanced and new topics in one of the areas of computer engineering. The topics can be changed from one year to another depending on the instructor's area of specialty.

22582	**Special Topics in Computer Engineering (1)**
	Credit Hours: 3
	The objective of this course is to introduce advanced and new topics in one of the areas of computer engineering. The topics can be changed from one year to another depending on the instructor's area of specialty.
22583	**Special Topics in Computer Engineering (2)**
	Credit Hours: 3
	The objective of this course is to introduce advanced and new topics in one of the areas of computer engineering. The topics can be changed from one year to another depending on the instructor's area of specialty.
24583	**Special Topics in Power & Energy Engineering**
	Credit Hours: 3
	The objective of this course is to introduce advanced and new topics in one of the areas of Energy and Power engineering. The topics can be changed from one year to another depending on the instructor's area of specialty.
25420	**Network Security**
	Credit Hours: 3
	This course introduces fundamental security aspects in computer networks and wireless telecommunications. Topics include introducing security protocols for: Network Access Control, Transport-Level Security, Wireless Network Security Protocols, Electronic Mail Security, IP Security, and Internet Authentication Applications.
25441	**Wireless Networks**
	Credit Hours: 3
	The primary objective of this course is to learn the fundamental principles of wireless networks. The topics include, wireless network standards and protocols, wireless communication technologies, Wireless Personal Area Networks (WPAN), Wireless Local Area Networks (WLAN) and Wireless Mobile Networks (WMN).

25541	**Cloud Computing & Security**
	Credit Hours: 3
	This course provides an introduction to cloud computing. The course starts by covering the cloud enabling technologies. Then it proceeds to explain the fundamentals of cloud computing, different service and delivery models. The course also covers different cloud architectures along with providing a business perspective on making choices to migrate to the cloud. Finally, the courses covers could security and possible cloud related threats.
25576	**Network Performance Analysis**
	Credit Hours: 3
	The course covers three main techniques for the performance analysis of computer networks: queueing theory, simulation, and measurement. The course emphases on data presentation; statistical analysis of simulated data; comparing systems using sample data; introduction to experimental design; bandwidth estimation; introduction to simulation analysis and random number generation. Students will learn techniques to analyze and compare computer systems in general and computer networks in particular.
25586	**Hardware Security**
	Credit Hours: 3
	This course covers basic concepts in the security of hardware systems. Topics include; active and passive attacks, hardware clonability, security for RFID tags, side channel attacks, counterfeiting, and design of hardware security primitives (e.g., random number generators, crypto-processors).
25593	**Special Topics in Network Security Engineering (1)**
	Credit Hours: 3
	The objective of this course is to introduce advanced and new topics in one of the areas of Network Security Engineering. The topics can be changed from one year to another depending on the instructor's area of specialty.
25594	**Special Topics in Network Security Engineering (2)**
	Credit Hours: 3

	The objective of this course is to introduce advanced and new topics in one of the areas of Network Security Engineering. The topics can be changed from one year to another depending on the instructor's area of specialty.
25595	**Special Topics in Information Security (1)**
	Credit Hours: 3
	The objective of this course is to introduce advanced and new topics in one of the areas of Information Security. The topics can be changed from one year to another depending on the instructor's area of specialty.
25596	**Special Topics in Information Security (2)**
	Credit Hours: 3
	The objective of this course is to introduce advanced and new topics in one of the areas of Information Security. The topics can be changed from one year to another depending on the instructor's area of specialty.
27455 23457 23552	**Cellular Communications**
	Credit Hours: 3
	Elements of cellular radio systems: specifications, cell coverage for signal traffic, cell site, mobile antenna, frequency management and channel assignment. GSM network systems. Introduction to the latest developments.
27550 23571	**Digital Signal Processing**
	Credit Hours: 3
	Discrete-time signals and systems. Frequency analysis of discrete-time signals and systems. Sampling and quantization. Discrete Fourier transform. Windowing effect. Z-transform. FIR and IIR Digital filters design. Digital filters realization. Fast Fourier transform.
27551	**Wireless Internet of Things**
	Credit Hours: 3
	Comprehensive introduction to the Wireless Internet-of-Things (WIoT) principles and standards will be provided. Evolution and development of WIoT technologies with a focus on

	cellular IoT standards, physical layer concepts, implementations, and enhancements. Vital design components in (EC-GSM- IoT, LTE-M, NB-IoT, and 5G) are examined. Analytical discussion of unlicensed spectrum technologies (LoRa, SigFox, Inginue, IEEE802.11ah, etc) from practical aspects view point will be conducted. Performance evaluation studies will be performed. Introduction Fog computing platforms and key attributes, Fog distributed infrastructure for IoT, and management of heterogeneous resources. Course projects will complement and emphasize current and future key-points and trends in the WIoT domain.
23576	**Wireless Internet of Things**
	Credit Hours: 3
	Overview of the Wireless Internet of Things (WIoT) concepts, standards, including benefits, limitations, and operation. Identifying the key drivers behind the development of WIoT as well as implementation. Key technology concepts of the radio interface, design requirements of the cellular IoT standards (EC-GSM-IoT, LTE-M, NB-IoT, and 5G) are explored as well as unlicensed spectrum technologies (LoRa, SigFox, Inginue, ..etc) . Performance comparisons will be carried-out.
27582	**Special Topics in Communications Engineering**
	Credit Hours: 3
	The objective of this course is to introduce advanced and new topics in one of the areas of communications engineering. The topics can be changed from one year to another depending on the instructor's area of specialty.
23582	**Special Topics in Communications Engineering (1)**
	Credit Hours: 3
	The objective of this course is to introduce advanced and new topics in one of the areas of Communications engineering. The topics can be changed from one year to another depending on the instructor's area of specialty.
23581	**Special Topics in Communications Engineering**
	Credit Hours: 3

	The objective of this course is to introduce advanced and new topics in one of the areas of Communications engineering. The topics can be changed from one year to another depending on the instructor's area of specialty.
11207	**Visual Programming**
	Credit Hours: 3
	This course introduces computer programming using a modern visual programming language with object-oriented programming principles. Emphasis is on event-driven programming methods, including creating and manipulating objects, classes, and using object-oriented tools such as the class debugger.
11343	**Special Topics in Computer Science (1)**
	Credit Hours: 3
	This course aims to introduce new topics in computer science and information technology. The department determines the content of the course.
11427	**Database Systems (2)**
	Credit Hours: 3
	Advanced topics in Database management systems. Processing of queries. Systems of protection and confidentiality. Distributed databases. Processing of transactions. The retrieval system. Synchronous transactions control system. Canonical databases. Writing a technical report on a selected topic and presenting it within the class.
11428	**Artificial Intelligence**
	Credit Hours: 3
	This course aims to introduce the basic principles, techniques, and applications of Artificial Intelligence. In this course, emphasis will be placed on the teaching of these fundamentals with the appropriate tools and software of implanting them. Assigned projects promote a 'hands-on' approach for understanding, as well as a challenging avenue for exploration and creativity. Topics include a historical perspective of AI and its foundations, problem solving using search, inference, knowledge representation, and learning. AI techniques in intelligent systems, expert systems, artificial neural networks and other machine learning models. AI

	development tools such as an 'AI language', and/or data mining tool, experiment with a machine learning model for simulation and analysis At the end of this course, the students are expected to apply basic principles of AI in solutions that require problem solving, demonstrate proficiency in developing AI applications, and applying scientific method of machine learning models, with ability to discuss their limitations and scope.
11436	**Distributed Systems**
	Credit Hours: 3
	The course aims to provide basic knowledge and understanding on how distributed systems operate. In this course, students will explore and learn the principles, architectures, algorithms and programming models used in distributed systems. Topics include advantages, hardware, software, design issues, communication in distributed systems, layered protocols, asynchronous transfer mode networks, client-server model, remote procedure call, RMI, group communication, clock, mutual exclusion, election algorithms, atomic transactions, deadlocks, processes and processors, threads, system models, allocation, scheduling, fault tolerance, real time, distributed shared memory, consistency, page, variables, object-oriented based and case studies. At the end of this course, students are expected to be able to summarize and describe general properties, challenges, and characteristics of distributed systems. Additionally, students should have the ability to describe general distributed algorithms for synchronization and concurrency, coordination, transactions, and replication
11446	**Special Topics in Computer Science (2)**
	Credit Hours: 3
	This course aims to introduce new topics in computer science and information technology. The department determines the content of the course.
11464	**Information Systems Security**
	Credit Hours: 3
	This course aims to provide a deep and comprehensive study of the security principles and practices of information systems. Topics include security threats, vulnerabilities and countermeasures, attacks, security services (confidentiality, integrity, availability,

	nonrepudiation, accountability), cryptography: classical encryption techniques, block ciphers and stream ciphers, symmetric-key and asymmetric-key cryptography, authentication and digital signature, key management and cryptographic protocol, DES and AES, Block cipher operation modes, asymmetric ciphers: RSA, Diffie-Hellman key exchange, hash functions, MAC functions, digital signature: digital Signature Standard DSS, key management and distribution, X.509 certificates, user authentication, access control, security in operating systems, web security: SSL and TLS, electronic mail security (PGP. MOME), malicious software, and firewalls. At the end of this course, students are expected to be familiar with many of the basic principles and practices in information systems security. In particular, understand what the foundational theory is behind information security, what the common threats are, what are the basic principles and techniques when designing a secure system, and how to gauge the protections and limitations provided by today's technology
21573	**Image Processing**
	Credit Hours: 3
	Enhancement in the spatial domain. Image enhancement in the frequency domain. Image restoration. Color image processing. Wavelets. Image compression. Morphological image processing. Image segmentation
22544	**Internet Protocols**
	Credit Hours: 3
	Basic principles and architecture of Internet. IP protocol. Routing algorithms. TCP, UDP, and traffic characteristics. IP addressing. Network applications and specific protocols: Telnet, Rlogin, HTTP, FTP, NSF, SMTP, e-mail and directory services. SNMP protocol. Selected advanced topics.
22520	**Parallel Processing**
	Credit Hours: 3
	Fundamental concepts of parallel processing and parallel architectures. Parallel programming paradigms: Distributed-memory (message-passing) and shared-memory

	programming. Parallel algorithms design and implementation. Performance analysis: speedup, efficiency, and scalability. Parallel programming environments and tools.
22545	**Neural Network and Fuzzy Logic**
	Credit Hours: 3
	Introduction to Artificial Neural Networks (ANN) and fuzzy systems. The Perceptron. Perceptron learning rule. Multi-layer perceptron. Hebbian learning algorithm and its variations. Widrow-Hoff learning algorithm and its applications. The Back Propagation (BP) learning algorithm and its variations. Unsupervised learning. Self-organization maps. Associative learning rules. Unsupervised Hebb rule. Instar rule. Outstar rule. Radial basis networks. Hopfield networks. Recurrent ANNs. Reinforcement learning via Approximate Dynamic Programming (ADP). Fuzzy set theory. Fuzzy logic. Fuzzy membership functions. Fuzzy relations. Fuzzy implications. Fuzzification and defuzzification. Fuzzy rule base and fuzzy inference engine. Applications: control systems, robotics, pattern recognition, nonlinear system modeling, speech processing, image processing, filtering systems, machine/artificial intelligence, data mining and knowledge discovery.