Course Description

11100	**Computer Skills (Remedial)**
	Credit Hours: 0
	This course aims to develop learners' ability to use computers in various aspects of their lives. The course introduces the primary concepts of computers, and the basics of using a GUI-based desktop operating system and office productivity tools including word processing, spreadsheets, and presentation applications, in addition to basics of using emails and navigating through the world wide web. At the end of this course, the students are expected to be able to use desktop computer for everyday tasks.
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.
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.
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.
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.
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.
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 behavior 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.
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 deals with the concept of physical education and how it relates to our general concept of education, as well as its objectives and historical development. Also examined are 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 student also learns about 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 also examines a number of today's diseases such as obesity, anorexia, diabetes and heart disease, concentrating on their causes and how to prevent them. The course discusses some contemporary issues regarding demand for sports activities.
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 confro nt 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 includes the definition of human rights, their importance, characteristics, intellectual and philosophical roots. It focuses on the historical development of human rights, their sources, types, and criteria for differentiating them, including civil and political rights, economic, social and cultural rights. in addition, the course addresses human rights that are guaranteed through charters, conventions, international declarations, national legislation and mechanisms for protecting these rights. The course also sheds light on humanitarian intervention and attitudes towards it, especially in the post-Cold War period. It, further, deals with the impact of globalization mechanisms on human rights, with a focus on discussing applied cases at the international level
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.
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.
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 and Writing Skills**
	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.
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.
11103	**Structured Programming**
	Credit Hours: 3
	This course aims to introduce the fundamentals of structured programming using a high-level programming language. Topics include concepts of structured programming, program design,

	development. Syntax and semantics of the presently adopted language so that students will develop the ability to program in the language. Basic elements of the language: variables, constants, and data types. Basic input/output functions. Conditional and iterative control structures. Functions (or methods) and parameter passing. Recursive functions (or methods). References and dynamic variables. Basic data structures: one and two-dimensional arrays, string manipulation and structure. At the end of this course, students are expected to be able to analyze a computing problem, design, and implement a solution using a high-level programming language.
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
	Topics of study: 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.
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. Dime nsions. 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.
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.
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.
11325	**Database Fundamentals**
	Credit Hours: 3
	This course aims to introduce the fundamentals of database systems design with focus on applications in Engineering Disciplines. Topics include: Database Basics and Applications DBMS Components Data Modeling & Entity Relationship Diagrams Relational vs Modern Databases incl. OO Databases Data Integrity & Dependencies

	Query Languages Normalization and Redundancy Elimination More Applications – Client Server, Big Data and Cloud Databases By the end of the course, students are expected to be familiar with many of the principles and concepts related to databases and how these are applied in real applications.
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.
20331	**Engineering Mathematics (2)**
	Credit Hours: 3
	Vector Fields, Divergence of a Vector Field, Curl of a Vector Field, Line Integrals, Path Independence of Line Integral, Green's Theorem in the Plane, Surface Integrals, Divergence Theorem for Gauss, Stoke's Theorem, Fourier Series, Functions of Any Period, Even and Odd Extensions, Fourier Integral, Fourier Transforms; PDEs: Basic Concepts; Modeling: Vibrating String, Wave Equation, Separation of Variables, One-dimensional Heat Equation; Heat Equation: Solution by Fourier Transforms, Laplacian in Polar Coordinates, Laplace's Equation in Cylindrical and Spherical Coordinates, Solution by Laplace Transform.
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.
21233	**Electronics Circuits Fundamentals**
	Credit Hours: 3
	Diode circuit models and applications (MOSFET (NMOS AND PMOS)) devices, regions of operation. Basic amplifier circuits using MOSFETs, Differential, OP-AMP applications (inverting and non-inverting configurations, summer, differentiation, integrator, Schmitt trigger). Introduction to ADCs. Introduction to CMOS digital logic families. Basic digital circuits implemented in CMOS Technology. Memory circuits.
21319	**Electronic Circuits Fundamentals Lab**

	Credit Hours:1
	Diode circuit models and applications. MOSFET devices. OP-AMP applications (inverting and non-inverting configurations, summing amplifier, differentiator, and integrator). Schmitt trigger circuit. A/D and D/A converters. CMOS logic gates & characteristics. CMOS digital logic families.
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.
21331	Electronics (2)
	Credit Hours: 3
	Operational amplifiers: basic theory, characteristics and applications. MOSFET current mirrors. Differential and multistage amplifiers. Frequency response of single and multistage CMOS amplifiers. Negative feedback analysis: feedback topology, properties and stability analysis. Operational amplifier design and simulation project .
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.
21581	**Special topics in Electronics Eng.**
	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.
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).
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.
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.
22242	Object Oriented Laboratory
	Credit Hours: 1
	Laboratory sessions on the different aspects and topics of object-oriented programming.
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.
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.
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.
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.
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.
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.
24411	**Engineering Ethics**
	Credit Hours: 3
	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
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.
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.
24583	**Special Topics in Power & Energy Eng.**
	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.
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.
27411 - 23411	**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.
27251	**Introduction to IoT**
	Credit Hours: 1
	IoT concepts. Hardware and software components. IoT Communication. IoT sensor networks. Data collection of IoT systems. Embedded systems, networks circuits and applications. Smart devices. IoT programming. IoT applications in industry: case study.
27331	**Introduction to IoT**

	Credit Hours: 3
	IoT concepts. Hardware and software components. Overview of IoT Communication. Overview of IoT sensors and actuators. Data collection of IoT systems. Embedded systems, networks, circuits, and applications. Smart devices and IoT simulation. Demonstration for IoT applications in industry: a case study. IoT applications in health: a case study.
27332	Introduction to IoT
	Credit Hours: 1
	IoT concepts. Hardware and software components. IoT Communication. IoT sensor networks. Data collection of IoT systems. Embedded systems, networks circuits and applications. Smart devices. IoT programming. IoT applications in industry: case study
27321 - 23321	**Electromagnetics (1)**
	Credit Hours: 3
	Review of coordinate systems and vector calculus. Electrostatic fields. Electric fields in material space. Magnetostatic fields. Magnetic fields in material space. Maxwell's equations.
27351	**Internet of things programming and applications**
	Credit Hours: 3
	IoT programming using scripting languages such as Python and Programming languages such as C, and C++. Interfacing IoT Platforms such as Arduino and Raspberry Pi. IoT simulation using Packet Tracer. IoT cloud Solutions. Application Programming Interfaces (APIs) and Socket Programming for IoT Communication Protocols. Graphical programming for IoT data visualization and analytics. IoT data management.
27352	**Internet of things programming and applications Lab**
	Credit Hours: 1
	Introduction to scripting languages including Python, IoT data processing and cloud computing, APIs and webserver applications, IoT data visualization.
	Signals and Systems
	Credit Hours: 3

27353 - 23351	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.
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.
27450	**Antennas and Waves Propagation**
	Credit Hours: 3
	Electromagnetic theory review. Transmission lines theory and Waveguides. Antenna types: wire antennas, loop antennas, and array antennas. Antenna parameters. Dipoles and Monopoles. Parabolic antenna and patch antenna. Antenna design fundamentals. Aperture antenna. Antenna arrays analysis. Smart antennas concept. Modes of propagation. Radio wave propagation in free space and types of waves. Basic propagation models.
27451 -	**Communication Networks**
	Credit Hours: 3
	Introduction to Communication Networks: Data Communication, Protocol Architecture, OSI Model and TCP/IP protocol suite, Physical Layer (Digital Transmission, Transmission Media, Signal Encoding Techniques), Data-Link Layer (Error Detection and Correction, Flow and Error

23454	Control Protocols, Medium Access Control), Network Layer (Services and Performance, Internet Protocol, Routing Algorithms, WAN Technology, and Protocols), Transport Layer (UDP, TCP, Transmission Control Protocols). Overview of IoT application layer Protocols (MQTT and COAP). Multiplexing, Ethernet and Wireless Networks, Network Management, Advanced Topics (Software-defined Network, Network Function Virtualization).
27452 - 23455	**Communication networks Lab** Credit Hours: 1 Network structure evaluation. Packet routing and delay evaluation. Throughput evaluation. Packet arrival and queue distribution. Open project: evaluation of a complete network performance and usage of different technologies to improve the actual performance.
27453	**IoT Sensors and Applications** Credit Hours: 3 IoT sensors and actuators, types and characteristics. Microcontrollers and systems on chip. Machine to Machine communication. Low power wireless networks. Applications on IoT storage and time series databases. Applications: IoT health, IoT smart grid and IoT traffic.
27470	**IoT Sensor Networks** Credit Hours: 3 Introduction to the basics of wireless sensor networks (WSNs), remote sensing, and their applications in the IoT. Topics include: IoT sensor networks topologies, deployment, and applications. Principles and methods of remote sensing. Characteristics of remote sensors and remote sensing platforms. Resource management and sensing scheduling. Routing and traffic management protocols for IoT sensor networks. Selected optimization techniques and their role in IoT sensor networks management and orchestration. Distributed adaptation in IoT sensor networks. Localization and synchronization in IoT sensor networks. Data acquisition, manipulation, storage, and retrieval. Attacks, vulnerabilities, and security management in IoT sensor networks.
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.
27454	**IoT Sensor Networks**
	Credit Hours: 1
	Experiments on IoT sensors and actuators. Microcontrollers and system on chip (Arduino، STM 32 Raspberry Pi، Nucleo). Machine to Machine communication for WPAN (IEEE802.15.4). WLAN and LPWAN (LoRA). Applications: IoT health, IoT smart grid, IoT traffic.
27471	**IoT Sensor Networks Lab**
	Credit Hours: 1
	Experiments on IoT sensors and actuators. Microcontrollers and system on chip (Arduino، STM 32 Raspberry Pi، Nucleo). Machine to Machine communication for WPAN (IEEE802.15.4). WLAN and LPWAN (LoRA). Applications: IoT health, IoT smart grid, IoT traffic.
27455 - 23457	**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.
27420	**Wireless and Mobile Communications**
	Credit Hours: 3
	Evolution of Cellular and mobile communications systems. Overview of fundamental architectures of cellular and mobile networks. The cellular concept. Truncking theory and Grade-of-Service. Mobile radio propagation and multipath fading channels. Multiple radio access, multiple division techniques, channel allocation, mobile communication systems.

	Modulation techniques for existing mobile communications systems. Recent trends and advances.
27430	**IoT Middleware Platforms**
	Credit Hours: 3
	Introduction to the middleware and Service-Oriented Architecture (SOA) for the IoT. Topics include: The middleware layer and its role in the IoT architecture. Introduction to SOAs and their basic principles. Middleware characteristics. Functional and non-functional requirements. IoT system integration. Web services and REST architecture style. Web ontologies and semantics. Existing IoT middleware standards. Open-source and commercial middleware solutions. Middleware security.
27456 - 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.
27490	**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.
27441 - 27541	**IoT Security and Privacy**
	Credit Hours: 3
	IoT security challenges, vulnerabilities and requirements. Data confidentiality, data encryption and data authentication. Secured protocols for IoT infrastructure. IoT attacks.
27542	**Internet of Things Security Lab**
	Credit Hours: 1
	This lab provides students with practical experience on lunching various types of attacks against the Internet of Things. Topics include: Searching for internet of things targets,

- 27442	reconnaissance, IoT enumeration, IoT remote code execution, IoT firmware emulation, IoT firmate extraction and exploitation, IoT firmware backdooring, playing with JTAG/SPI and UART, man in the middle attacks and securing internet of things.
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 IoT**
	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. Course projects will complement and emphasize current and future key-points and trends in the WIoT domain.
27552	**Cellular Communications and Wireless IoT Lab**
	Credit Hours: 1
	Experiments will involve cell analysis, planning and management encompassing frequency and channel assignment. Performance evaluation of cellular networks, including cellular IoT (CIoT) standard and technologies, will be conducted considering coverage, capacity, interference.etc). Testbeds will consider various wireless internet-of-things (WIoT) connectivity technologies (of both licensed and unlicensed spectrum) within the overall communications platform.
	Mobile Communications & Wireless IoT Lab
	Credit Hours: 1

27520	Experiments will involve cell analysis, planning and management encompassing frequency and channel assignment. Performance evaluation of cellular networks, including cellular IoT (CIoT) standard and technologies, will be conducted considering coverage, capacity, interference. etc). Evaluation of various wireless internet-of-things (WIoT) connectivity technologies (licensed and unlicensed spectrum) within the overall communications platform. Multipath and Doppler frequency shift measurement
27570	**Fog Computing for IoT**
	Credit Hours: 3
	Introduction to a hierarchical structure of fog nodes in IoT. The interface between cloud environment, edge, and local IoT devices. Challenges and advantages of fog computing, including latency, bandwidth, and localized computation. Security, privacy, and challenges in fog enabled IoT solutions. Case studies on the integration of fog computing in IoT architecture.
27571	**Smart Cities**
	Credit Hours: 3
	Introduction to smart cities in the context of IoT. Taxonomy of intelligent city IoT modules: vehicular telematics, advanced energy grids, environmental sensor networks, and intelligent public safety systems. Data acquisition, fusion, and analytics methodologies optimized for urban informatics. Advanced communication protocols, low-power WANs, and RF mesh technologies underpin intelligent city networks. Intricacies of cyber-physical system integration and AI in urban contexts to enhance Quality of Life. Multilayered security frameworks, data integrity checks, and privacy preservation techniques in smart city solutions.
27591	**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.
27592	**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.
27457 - 23551	**Optical Communications**
	Credit Hours: 3
	Light propagation. Types of optical fibers and their properties. Light sources for optical fibers. Optical digital communications. Fiber optic communications.
27458 - 23482	**Satellite Communications**
	Credit Hours: 3
	Orbital aspect of satellite communications and spacecraft. Satellite link design, modulation and multiplexing techniques for satellite links. Earth station technology. Global position satellite systems (GPS)
27481 - 23584	**Coding and Cryptography**
	Credit Hours: 3
	Shannon limit theorem. Punctured codes. Turbo code-decode process (iterative decoding). Iterative decoking error performance for block and convolutional codes. Private and public key cryptography.
27554 - 23587	**Digital Image Processing**
	Credit Hours: 3
	Basics of 2D and 3D images. Image sampling and quantization, color, segmentation, morphological image processing, linear image filtering and correlation, image transforms multiresolution image processing, edge detection and noise reduction and restoration, feature extraction and recognition tasks. Image quality enhancement using coding.
27555 - 23586	**Sensor Networks**
	Credit Hours: 3
	Introduction to the Wireless Sensor Network (WSN) concepts and Applications. WSN deployment and Configuration. Localization and calibration in WSN. WSN Coverage and connectivity. Shadowing and faking effects in Wireless Communications. WSN Medium access and Scheduling sleep cycles. Data Acquisition. Lifetime optimization. Geographic Routing and

	Querying. Storage and retrieval. Collaborative Signal Processing and Distributed Computations. Energy-efficient distributed algorithms. Security, Attacks and Privacy issues over WSN.
27556 - 23585	**Wireless Network Architecture**
	Credit Hours: 3
	This course emphasizes the description, modeling and performance evaluation of the physical and media access control layers of the wireless personal area networks, Wireless Local Area Networks, Wireless Ad hoc networks (WANET) and Wide Area Networks. Vehicle to vehicle (V2V), Vehicle to Infrastructure (V2I) and Vehicle to Everything (V2X) communications will also be discussed.
27557 - 23483	**Advanced Communications Systems**
	Credit Hours: 3
	Point-to-point and point-to-multipoint communication link design and analysis. Optimal design of practical communication systems. Spread spectrum, multicarrier technologies.
27558 - 27594	**Smart Grid Communications**
	Credit Hours: 3
	An overview of power systems, production, generation, transmission, distribution and consumption. Smart grid systems and their application, benefits and standards. Communication technologies and network architectures used in smart grids. A brief introduction to power line communication, including broadband and narrowband. The interference of ZigBee and WiFi protocols and its deployment for smart grid applications. Applications of wireless sensor networks in the smart grid. The role of communication in building a smart home. Cyber security attacks that target the generation, distribution, control, and the consumption.
	Special Topics in IoT
	Credit Hours: 3

27580	The objective of this course is to introduce advanced and new topics in one of the areas of Internet of Things engineering. The topics can be changed from one year to another depending on the instructor's area of specialty.
27582 - 23582	**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.
27583	**Blockchain in the Internet of Things**
	Credit Hours: 3
	Introduction to blockchain technology, its programming languages platforms, data storage and manipulation. blockchain in IoT systems, programming, applications, streaming, and data storage and analysis.
27584	**Internet of Robotics**
	Credit Hours: 3
	Introduction to Robotics and Internet of Things and basic components. Basic electrical principles underpinning robotics and internet of things (IoT). Essential electronic components for robotics and internet of things. Selected sensors for internet of things and actuators for robotics. Legal, social, ethical and professional issues in context of robotics and Internet of Things.
27585	**Cloud Computing in IoT**
	Credit Hours: 3
	Introduction to cloud computing. Cloud concepts and capabilities across the various Cloud service models including Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), and Business Process as a Service (BPaaS). Cloud security model and associated challenges. Cloud platforms for IoT. Cloud privacy for IoT applications.
	Control Technology of IoT
	Credit Hours: 3

27586	This course introduces recent trends in control theories and the use of common control technologies and the IoT in relations to various representative applications, including smart grid, intelligent transportation, intelligent agriculture, and intelligent healthcare. It aims to familiarize with typical field bus control systems (such as Ethernet/IP, ControlNet, LonWorks, and Controller Area Network (CAN). Discussion will also include the control theories and methods with mathematical modelling for control systems, PID controller, time-domain interpretation, and frequency-domain interpretation. Wireless network control system analysis and design will be performed.
27587	**Network Protocols for IoT** Credit Hours: 3 In this course we will focus on how the IoT works and explore how 'things' connect to it. Determine if the connection and processing is local (fog) or remote (cloud). Data networks, connection types, layer models and corresponding analysis of IoT protocols and standards (MQTT, XMPP, DDS, AMQP, LwM2M, LIBP). Evaluation of different infrastructure components and network systems will be performed. Design of a basic network based on specifications will be of IoT concepts will be performed.
27588	**Autonomous Vehicles** Credit Hours: 3 Concepts and advances of self-driving cars. Safety and performance metrics. Requirements for autonomy and elements of driving environment. Self-driving hardware and software architectures, cost, reliability, performance and complexity that constrain autonomous vehicle design. Safety assurance for autonomous vehicles on public roads. Vehicle dynamic modeling, longitudinal and lateral control and their simulation.
27589	**Optimization** Credit Hours: 3 Matrix algebra, fundamentals of modeling and optimization. Formulation of classification and regression models. Constrained optimization. Deterministic and stochastic gradient search. Time series processing: time and frequency domain. Information redundancy. Digital filters design



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