Course Description

Course Name	:	**Computer Skills and Distance Learning**	**Course Number**	:	**CS 101**
Credit Hours	:	**[1] Th. : [1] Pra. : [0]**	**Prerequisites**	:	**----------**

Concepts, trends, techniques and applications of E-learning. Concepts and skills related to the setup and use of online collaborative tools, such as storage, productivity, applications, social media, calendar, web meetings, learning environment and mobile technology. Concepts related to secure use of Information and Communication Technology (ICT) in daily life and skills used to maintain a secure network connection, use internet safely and securely, and manage data and information appropriately. Concepts and skills related to digital images, image editing application to enhance images and apply effects.

Course Name	:	**Computer Skills(2)**	**Course Number**	:	**CS 103**
Credit Hours	:	**[3] Th. : [2] Pra. : [3]**	**Prerequisites**	:	**-**

Basics of programming, algorithm development using top-down design with syntax and semantics of the C++ programming language, creating, compiling and executing C++ programs, primitive data types, operations, Loops, control structures, procedures and functions, arrays and classes.

Course Name	:	**Introduction to Internet of Things**	**Course Number**	:	**IOT 251**
Credit Hours	:	**[2] Th. : [2] Pra. : [0]**	**Prerequisites**	:	**CS 122**

Introduces the fundamental concepts of Internet of Things and motivates the study of Internet of Things. It focuses on the Devices, Data Collection, Networking, Cloud Computing, Risks, Opportunities in Internet of Things context and future for Internet of Things.

Course Name	:	**Object Oriented Programming**	**Course Number**	:	**CS 122**
Credit Hours	:	**[3] Th. : [3] Pra. : [0]**	**Prerequisites**	:	**CS 103**

Object-oriented (OO) programming environment, OO building blocks, input/output, loops, decisions, functions, arrays and strings, data structures, encapsulation, advanced variables, object oriented programming, useful OO features, classes and objects, inheritance, composition, polymorphism, method overloading, handling exceptions, thread programming and multithreading by using Java Language.

Course Name	:	Object Oriented Programming Lab	Course Number	:	CS 123
Credit Hours	:	[1] Th. : [0] Pra. : [3]	Prerequisites	:	*CS122

Structured Programming Skills Recap, Object-Oriented Programming(OOP) Skills, Classes And Objects ,Access Modifiers, Constructors, Constructor Overloading, Destructors, Using Constant in OOP, Using Static in OOP, Methods and Parameter Passing , Array of Objects, Composition, Inheritance , Abstract Classes, Derived Classes, Interfaces, Method Override ,Polymorphism, Working with Files, Exception Handling, OOP and GUI by using Java Language.

Course Name	:	Java Programming	Course Number	:	CS 222
Credit Hours	:	[3] Th. : [3] Pra. : [0]	Prerequisites	:	CS 122

Introduction to Java, the Java programming environment, variables, primitive data types, expressions, control constructs, strings in Java, arrays and vectors, Hash tables, files and I/O in Java, loops, Java GUI, components, events, layout managers, improved GUI libraries, threads, synchronization, Sockets, writing a server and a client.

Course Name	:	Java Programming Lab	Course Number	:	CS 223
Credit Hours	:	[1] Th. : [0] Pra. : [3]	Prerequisites	:	*CS 222

Introduction to Java, JDK and IDE Installation, Input and Output Statements, Construct Basic Java Program with Class, Control Structures, Methods and Objects, Constructors, Arrays and Array List, Inheritance, Polymorphism, Abstract Classes and Interfaces, Exception Handling, Strings, File Processing, GUI Basics and Layout, Event Driven Programming.

Course Name	:	Data Structures and Algorithms	Course Number	:	IOT 211
Credit Hours	:	[3] Th. : [2] Pra. : [3]	Prerequisites	:	CS 122

Introduction to data structures, problem specification and program design, analysis, testing, verification, and correctness of algorithms, logical and physical representation of data, data structure operations, linked lists, queues, stacks, searching and sorting, tree data structures, sorting by using Java Language.

Course Name	:	Digital Logic	Course Number	:	IOT 231
Credit Hours	:	[3] Th. : [2] Pra. : [3]	Prerequisites	:	CS103

Numbering systems, Boolean algebra, logic algebra, basic logic gates, minimization of logic functions, combinational logic: adders, subtractors, encoders and decoders, multiplexers and demultiplexers, sequential logic: flip-flops, counters, registers and clocked sequential circuits.

Course Name	:	Internet of Things application programming	Course Number	:	IOT 322
Credit Hours	:	[3] Th. : [2] Pra. : [3]	Prerequisites	:	IOT 222

Basic concepts and how to program the projects and applications of the Internet of Things using one of the chips and microcontrollers that can be programmed in the Arduino C language, as well as identifying its various uses and applications in smart city projects, smart homes and other applications, as well as learning about the method of employing and programming electronic parts and sensors to implement Internet projects

Course Name	:	Databases Design and Management	Course Number	:	IOT 244
Credit Hours	:	[3] Th. : [2] Pra. : [3]	Prerequisites	:	CS 222

Basic concepts and terminology, database, database administrator, database management systems, characteristics of the database approach, the three level-schema architecture, data independence, the entity relationship model, notations and concepts, the relational model (concepts, constraints and operations), relational algebra, ER to relational mappings, the SQL language, functional dependencies and normalization.

Course Name	:	Artificial Intelligence	Course Number	:	IOT 342
Credit Hours	:	[3] Th. : [3] Pra. : [0]	Prerequisites	:	IOT 211

Introduction artificial intelligence (AI), history of AI, propositional calculus, predicate calculus, first-order logic, inference, soundness, completeness, unification algorithm, resolution, structures and strategies for state space search, data driven and goal driven search, breadth first search, depth first search, depth first iterative deepening search, heuristic search and games theory, greedy best first search, A* search algorithm, using heuristic search in games, Min-Max algorithm, alpha-beta pruning, planning, the language of planning problem. Algorithms and other technologies centered on big data mining to build smart systems.

Course Name	:	**Introduction To Computer Design**	**Course Number**	:	**IOT 332**
Credit Hours	:	**[3] Th. : [3] Pra. : [0]**	**Prerequisites**	:	**IOT 231**

Internal structure and operation of modern computer systems, Design and operation of the system bus, Design and operation of Arithmetic, Logic, and Shift Units, Control Unit: microprogrammed vs. Hardwired control, CISC and RISC architectures, Pipelining, cache memory and memory hierarchies, Interrupts and I/O structures.

Course Name	:	**Fundamentals of Operating Systems**	**Course Number**	:	**IOT 331**
Credit Hours	:	**[3] Th. : [3] Pra. : [0]**	**Prerequisites**	:	**CS 222**

Basic concepts and mechanisms of modern operating systems, history of operating systems, computer and operating system structures, basic issues in concurrency, thread management, deadlock control, synchronization, scheduling, memory management, process management, multi-threading.

Course Name	:	**Communications and Computer Networks**	**Course Number**	:	**CS 241**
Credit Hours	:	**[3] Th. : [3] Pra. : [0]**	**Prerequisites**	:	**CS 122**

Open system interconnection (OSI) reference model, TCP/IP reference model, physical layer, data link layer, network layer, transport layer, session layer, presentation layer, applications layer, LAN architectures, WAN architectures, network design, network management and network security.

Course Name	:	**Communications and Computer Networks Lab**	**Course Number**	:	**CS 242**
Credit Hours	:	**[3] Th. : [0] Pra. : [3]**	**Prerequisites**	:	*** CS 241**

Practices on pen system interconnection (OSI) reference model, TCP/IP reference model, physical layer, data link layer, network layer, transport layer, session layer, presentation layer, applications layer, LAN architectures, WAN architectures, network design, network management and network security.

Course Name	:	**Fundamentals of Cybersecurity**	**Course Number**	:	**IOT 344**
Credit Hours	:	**[3] Th. : [3] Pra. : [0]**	**Prerequisites**	:	**IOT 322**

Introduction to computer security , understanding the security issues in computing platforms and operating systems , database security, security policies, entity authentication, defense methods , writing secure programs, computer security threats and attacks including: vulnerabilities in the password authentication system, file system, virtual memory system, respond to potential violations, access control, threats and vulnerabilities to network architectures and protocols, e-mail security, IP security, web security, network attack propagation modeling ,traffic analysis, network security management techniques , firewalls. Introduce students to introductory topics in IoT security by gaining hands-on training on real IoT devices.

Course Name	:	**Applied Software Engineering**	**Course Number**	:	**IOT 343**
Credit Hours	:	**[3] Th. : [3] Pra. : [0]**	**Prerequisites**	:	**IOT 244**

Principles and practices of software engineering, software quality concepts, process models, software requirements' analysis, design methodologies, software testing and software maintenance, hands-on experience in building a software system using the waterfall life cycle model in the lab environment, software development life cycle deliverables, the requirements, specification and design documents, the system code, test plan, and user manuals.

Course Name	:	**Design & Organization of Embedded Systems**	**Course Number**	:	**IOT 222**
Credit Hours	:	**[3] Th. : [3] Pra. : [0]**	**Prerequisites**	:	**CS 122**

Introduction to embedded systems, C programming, embedded system design, introduction to Arduino, basic circuit diagrams, instruction sets, registers and memory access, digital I/O, LEDs and buttons, timers, debugging, pulse width modulation, servos, analog to digital converters, analog sensors , CPU bus, communication protocols, interrupts, communication, peripherals, sensors, embedded operating systems, embedded systems applications, power management, embedded algorithms.

Course Name	:	**Design & Organization of Embedded Systems Lab**	**Course Number**	:	**IOT 223**
Credit Hours	:	**[3] Th. : [0] Pra. : [3]**	**Prerequisites**	:	***IOT 222**

Apply C programming to embedded system design with Arduino, basic circuit diagrams, instruction sets, registers and memory access, digital I/O, LEDs and buttons, timers, debugging, pulse width modulation, servos, analog to digital converters, analog sensors , CPU bus, communication protocols, interrupts, communication, peripherals, sensors, embedded operating systems, embedded systems applications, power management, embedded algorithms.

Course Name	:	**Project-1 for Internet of Things students**	**Course Number**	:	**IOT 471**
Credit Hours	:	**[1] Th. : [-] Pra. : [-]**	**Prerequisites**	:	**90Cr. Hrs**
The student is expected to put into action his knowledge gained from the different courses in this study plan through a graduation project.					

Course Name	:	**Project-2 for Internet of Things students**	**Course Number**	:	**IOT 472**
Credit Hours	:	**[2] Th. : [-] Pra. : [-]**	**Prerequisites**	:	**IOT 471**
The student is expected to put into action his knowledge gained from the different courses in this study plan through a graduation project.					

Course Name	:	**Field Training for Internet of Things students**	**Course Number**	:	**IOT 473**
Credit Hours	:	**[3] Th. : [-] Pra. : [-]**	**Prerequisites**	:	**Cr.Hrs 90**
Practical training in the field, where students should register as trainees in IT sector, under the supervision of the department.					

Course Name	:	**Machine Learning**	**Course Number**	:	**IOT 442**
Credit Hours	:	**[3] Th. : [3] Pra. : [0]**	**Prerequisites**	:	**IOT 342**
Introduction to machine learning, artificial intelligence and reasoning under uncertainty, supervised learning, ensemble methods and boosting, neural networks, support vector machines, kernel methods, clustering and unsupervised learning, genetic algorithms, maximum likelihood, and computational learning theory, machine learning in data mining and applications, data preprocessing , cleaning , classification and clustering, web mining.					

Course Name	:	**Cloud Computing**	**Course Number**	:	**IOT 447**
Credit Hours	:	**[3] Th. : [3] Pra. : [0]**	**Prerequisites**	:	**IOT 342**
Cloud computing concepts, Cloud computing environments, Cloud services, Cloud characteristics and service attributes, Cloud category, risks and benefits of implementing cloud computing, security threat within a cloud computing infrastructure, Cloud Delivery Models, Cloud Architectural Models					

Course Name	:	**Special Topics in Internet of Things+**	**Course Number**	:	**IOT 455**
Credit Hours	:	**[3] Th. : [3] Pra. : [0]**	**Prerequisites**	:	**90Cr. Hrs**
Students are introduced to advanced selected topics in different areas of computing not covered in other courses. The topics covered vary from year to year, depending on the students and staff.					

Course Name	:	**Robotics and Autonomous Systems**	**Course Number**	:	**IOT 456**
Credit Hours	:	**[3] Th. : [3] Pra. : [0]**	**Prerequisites**	:	**IOT 321**
Introduction to Robotics, Introduction to autonomous systems, microcontrollers, embedded systems design, PIC and Arduino Platforms, Motor Principles, Interaction between real and digital world, Concepts of artificial intelligence, Gantry robot, Polar Robots, Articulated Robots, parallel robots, vehicle robots, Bluetooth communication programming, GSM communication programming, GPS communication programming, Wi-Fi communication programming, smart houses, smart robots, machine vision, audio and video communication programming, libraries and APIs.					

Course Name	:	**Discrete Mathematics**	**Course Number**	:	**IOT 114**
Credit Hours	:	**[3] Th. : [3] Pra. : [0]**	**Prerequisites**	:	**30202101**
Introduction to Logic, Propositional Logic, Predicate Logic, Formal and Informal Proofs, Sets, Set Operations. Functions, Countable and Uncountable Sets. Integers and Modular Arithmetic, Sequences, Summations, Mathematical Induction, Recursion, Counting, Permutations, Combinations , Probability ,Relations, Graph Theory , Trees.					

Course Name	:	**Principles of Numerical Analysis**	**Course Number**	:	**IOT 361**
Credit Hours	:	**[3] Th. : [3] Pra. : [0]**	**Prerequisites**	:	**IOT 114**
This course analyzed the basic techniques for the efficient numerical solution of problems in science and engineering. Topics spanned root finding, interpolation, approximation of functions, integration, differential equations and direct and iterative methods in linear algebra.					

Course Name	:	**Physics**	**Course Number**	:	**IOT 105**
Credit Hours	:	**[3] Th. : [3] Pra. : [0]**	**Prerequisites**	:	

Vectors, equations of motion, Newton's laws and applications, work, work and energy, electric force, electric field, electric flux, Gausses law and applications, potential difference and equipotential surfaces, electric potential due to point charges, energy stored in a system of point charges, capacitors, combination of capacitors, energy stored in a charged capacitor, electric current, resistance and Ohm's law, electrical energy and power, electromotive force, combination of resistances, Kirchhoff's laws, RC circuit, magnetic field, magnetic force on a charged particle, magnetic force on a current carrying conductor, Biot- Savart law, Amperes law, applications.

Course Name	:	**Physics Lab**	**Course Number**	:	**IOT 106**
Credit Hours	:	**[3] Th. : [3] Pra. : [0]**	**Prerequisites**	:	***IOT 105**

Significant figures and errors, measurements and uncertainty, vectors (equilibrium of forces), friction, conservation of energy, Galvanometer, Ammeter and Voltmeter, electric field mapping, Ohm's law, electric equivalent of heat, potentiometer, Kirchhoff's rules, parallel plate capacitor, RC circuit.

Course Name	:	**Applied Probability and Statistics**	**Course Number**	:	**IOT 361**
Credit Hours	:	**[3] Th. : [3] Pra. : [0]**	**Prerequisites**	:	**IOT 114**

Combinatorics and Probability, Discrete Distributions, Simulation,Discrete Decision Theory, Real Line-Probability, Continuous Distributions, Parameter Estimation.

Course Name	:	**Microcontrollers for Internet of Things Devices**	**Course Number**	:	**IOT 453**
Credit Hours	:	**[3] Th. : [3] Pra. : [0]**	**Prerequisites**	:	**IOT 222**

Overview of embedded systems and microcontrollers with a comprehensive in-depth look at the MSP43Q. Students will learn about this powerful mixed-signal, low power consumption microcontroller.

Course Name	:	**Wireless Communications for Internet of Things**	**Course Number**	:	**IOT 452**
Credit Hours	:	**[3] Th. : [3] Pra. : [0]**	**Prerequisites**	:	**IOT 251, CS 241**

This course will cover source coding for data compression, channel coding for error correction, digital transmission and reception, wireless channels, and the narrow-band Internet of Things communication system.

Course Name	:	**Programming Embedded Systems**	**Course Number**	:	**IOT 321**
Credit Hours	:	**[3] Th. : [2] Pra. : [3]**	**Prerequisites**	:	**IOT 222**

Embedded Systems implementation using programming of synchronous state machines to capture behavior of time oriented systems for running on microcontrollers.

Course Name	:	**Embedded Operating Systems**	**Course Number**	:	**IOT 333**
Credit Hours	:	**[3] Th. : [3] Pra. : [0]**	**Prerequisites**	:	**IOT 331**

This is a course to the use of Embedded Operating Systems (OS) as developing environment. Course also includes OS concepts and unique embedded application development.

Course Name	:	**Data Science**	**Course Number**	:	**IOT 451**
Credit Hours	:	**[3] Th. : [3] Pra. : [0]**	**Prerequisites**	:	**IOT 342**

Basic concepts and techniques, data science processes, data science tools, data types with examples of data collection and management, data sources, data collection, data exploration and repair, data storage and management, data from multiple sources, data analysis, introduction to statistics, basic machine learning algorithms, data visualization: its types, data formulation for visualization, the future of data science. Ethical and legal frameworks for data science.

Course Name	:	**Sensors for Internet of Things**	**Course Number**	:	**IOT 352**
Credit Hours	:	**[3] Th. : [3] Pra. : [0]**	**Prerequisites**	:	**IOT 321**

This course introduces sensors and sensor design for Internet of Things devices. Topics include history of Internet of Things enabled sensors, design and fabrication of smart sensors, theory and case studies of important smart sensors.

Course Name	:	**Internet of Things & Sensor Programming with Python**	**Course Number**	:	**IOT 351**
Credit Hours	:	**[3] Th. : [0] Pra. : [6]**	**Prerequisites**	:	**IOT 321**

This course will introduce students to the Python programming language as it applies to its interaction to sensor and Internet of Things devices.

Course Name	:	**Internet of Things Privacy**	**Course Number**	:	**IOT 457**
Credit Hours	:	**[3] Th. : [3] Pra. : [0]**	**Prerequisites**	:	**IOT 251**

Introduces the privacy issues related to Internet of Things technologies. Focuses on privacy preserving technologies regarding Internet of Things user data, access to such data and privacy law around such personal data.

Course Name	:	**Network Protocols for Internet of Things**	**Course Number**	:	**IOT 458**
Credit Hours	:	**[3] Th. : [3] Pra. : [0]**	**Prerequisites**	:	**IOT 352**

This course introduces the underlying network protocols for Internet of Things communications such as Message Queuing Telemetry Transport (MQTT), Constrained Application Protocol (CoAP), Extensible Messaging and Presence Protocol (XMPP), Advanced Message Queuing Protocol (AMQP), lightweight local Automation Protocol(LLAP) Simple Object Access Protocol(SOAP), AllSeen AllJoyn that concern with sending, receiving interaction and communication.

Course Name	:	**Embedded GUI Programming**	**Course Number**	:	**IOT 454**
Credit Hours	:	**[3] Th. : [3] Pra. : [0]**	**Prerequisites**	:	**IOT 351**
Graphical user interface (GUI) for embedded system included elements and style, events, component and object oriented user interface models, and graphical application programming issues.					

Course Name	:	**Big data analysis**	**Course Number**	:	**IOT 459**
Credit Hours	:	**[3] Th. : [3] Pra. : [0]**	**Prerequisites**	:	**IOT 451**
Data retrieval methods based on example, Big data management and retrieval systems, Linkages between data management processes and processing patterns of big data required for use in analytical applications in an expansive way, Data integration problem of big data.					

Course Name	:	**Introduction to Circuits & Electronic Hardware**	**Course Number**	:	**IOT 201**
Credit Hours	:	**[3] Th. : [3] Pra. : [0]**	**Prerequisites**	:	**IOT 231**
Introduction to resistive circuits, laws governing circuits, electronic switches, logic gates, electronic memories, standard input and output ports.					