Course Description

Course Name	:	Introduction to Artificial Intelligence		Course Number	:	AR142	
Credit Hours	:	[3] Th. : [3] Pra. : [0]		Prerequisites	:	30202102*	
Introduction to artificial intelligence, Uninformed, informed and Adversarial search, Partial observability; CSPs, Propositional Logic and related probability, Bayesian, Bayesian Network inference, Approximate inference in Bayesian Networks, Information gathering, Temporal models. Markov Decision Processes, Learning using Regression and Classification, Linear and Logistic regression, introduction to Learning methods using Bayesian Networks, Reinforcement learning , Q-learning, Probabilistic first order logic.							

Course Name	:	Artificial Intelligence Programming		Course Number	:	AR241	
Credit Hours	:	[3] Th. : [3] Pra. : [0]		Prerequisites	:	AR142	
This course introduces Python programming, it covers basic programming topics, such as variables, functions and loops, to more advanced topics. Moreover, students are expected to explore their programming skills in Lab. with guided programming exercises focusing on AI algorithms and applications.							

Course Name	:	Computer Skills (2) for Science Colleges		Course Number	:	30801101	
Credit Hours	:	[3] Th. : [2] Pra. : [3]		Prerequisites	:	CS101*	
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	:	Object Oriented Programming		Course Number	:	30801203	
Credit Hours	:	[3] Th. : [3] Pra. : [0]		Prerequisites	:	30801101	
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.							

Course Name	:	Object Oriented Programming Lab.		Course Number	:	30801204	
Credit Hours	:	[1] Th. : [0] Pra. : [3]		Co-Prerequisites	:	30801203*	
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.							

Course Name	:	Introduction to Unix	Course Number	:	AR231
Credit Hours	:	[1] Th. : [0] Pra. : [3]	Prerequisites	:	-

Introduction:, A brief history of UNIX, Architecture of the Linux operating system, General format of UNIX commands, The UNIX filesystem, Typical UNIX directory structure, Inspecting file content, Finding files, Sorting files, File compression and backup, Handling removable media, Processes, Pipes, Redirecting input and output, User Information and Communication, Printer control, Email utilities, Advanced text file processing, Manual pages, UNIX editors, The superuser root, User management, Reconfiguring and recompiling the Linux kernel, Cron jobs, Keeping essential system processes alive, Shells and shell scripts, Shell variables and the environment, Simple shell scripting, More advanced shell scripting, Start-up shell scripts.

Course Name	:	Calculus (1)	Course Number	:	30202101
Credit Hours	:	[3] Th. : [3] Pra. : [0]	Prerequisites	:	--

Functions: domain, operations on functions, graphs of functions, trigonometric functions; inverse functions; logarithmic and exponential functions; inverse trigonometric functions; limits and continuity; the derivative: techniques of differentiation, the chain rule, implicit differentiation; differentials; Roll's theorem; the main value theorem; increasing and decreasing functions; concavity; maximum and minimum values of a function, graphs of including rational functions; the indefinite integral; the fundamental theorem of calculus; integration by substitution; the area between a curve and x-axis.

Course Name	:	Calculus (2)	Course Number	:	30202102
Credit Hours	:	[3] Th. : [3] Pra. : [0]	Prerequisites	:	30202101

Hyperbolic functions; Techniques of integration; L'Hôpital's rule; improper integrals; applications of the definite integrals; Infinite series: geometric, p-harmonic, simple comparison tests, formal power series for some elementary functions, Taylor series; polar coordinates; parametric equations and applications.

Course Name	:	Principles of Information and Cyber Security	Course Number	:	ICS140
Credit Hours	:	[3] Th. : [3] Pra. : [0]	Prerequisites	:	30801101

Introduction to Information Security, Number theory and Discrete Logarithm Problem. Security Models and Policies, Cryptography Overview, Security Architectures, Including Identification, Authentication, and Access Control. Introduction to Malicious Software Including Viruses, Worms, Trojan Horses, etc. Program Security, Security tools, Assurance, Law and Ethics, Privacy and Privacy Enhancement tools. Human Resources Security.

Course Name	:	Machine Learning	Course Number	:	AR243
Credit Hours	:	[3] Th. : [3] Pra. : [0]	Prerequisites	:	AR142

This course covers essential machine learning algorithms. Topics include supervised learning algorithms (linear and logistic regression, generative models for classification, learning theory), deep learning algorithms (feedforward neural networks, convolutional neural networks, recurrent neural networks), unsupervised learning algorithms (variational autoencoders, generative adversarial networks, mixture models), and reinforcement learning (classic RL, deep RL).

Course Name	:	Machine Learning Lab.				Course Number	:	DS245	
Credit Hours	:	[1]	Th. :	[0]	Pra. : [3]	Prerequisites	:	AR243*	

In this course student will implement the machine learning concepts and algorithms that are covered in Machine Learning course in any suitable language selected by the department.

Course Name	:	Web Programming				Course Number	:	ICS222	
Credit Hours	:	[2]	Th. :	[2]	Pra. : [0]	Prerequisites	:	30801203	

Web design using HTML (Hypertext Markup Language) and CSS (Cascading Style Sheets), HTTP protocol planning and designing effective web pages; implementing web pages by writing HTML and CSS code; enhancing web pages with the use of page layout techniques, text formatting, graphics, images, and multimedia; and producing a functional, multi-page website, Client Server Architecture, Exploring HTML5, Introduction to server side language, Front-end Frameworks, Model View Controller Design Methodology, JQuery, Ajax and JSON, Deploying a web application, building Web Database System, Practical Aspects of Web Security, Search Engine theories.

Course Name	:	Web Programming Lab.				Course Number	:	ICS224	
Credit Hours	:	[1]	Th. :	[0]	Pra. : [1]	Prerequisites	:	ICS222*	

XHTML, Web server and Database Server, HTML5, CSS3, layout development, JavaScript, JQuery, Ajax, Form, Server Side Language, Form processing, Database system, Website Testing.

Course Name	:	Scripting Programming				Course Number	:	ICS242	
Credit Hours	:	[2]	Th. :	[1]	Pra. : [3]	Prerequisites	:	30801203	

This course introduces the scripting languages necessary in custom programming for server administration and security purposes. Introductory level programming will be covered using JavaScript, VBScript, Windows Shell Script, and Perl Scripting languages. Previous programming experience is required.

Course Name	:	Fundamentals of Cryptography				Course Number	:	ICS244	
Credit Hours	:	[3]	Th. :	[3]	Pra. : [0]	Prerequisites	:	ICS261	

Introduction to Modern Cryptography, with an Emphasis on the Fundamental Cryptographic Primitives of Symmetric and Asymmetric Public-Key Encryption, Hash Functions, Message Authentication, RSA, Diffie-Hellman, Certification Authorities, Digital Signatures, Pseudo-Random Number Generation, and Basic Protocols andtheir Computational Complexity Requirements Introduction to Elliptic Curve Cryptography.

Course Name	:	Introduction to Number Theory				Course Number	:	ICS261
Credit Hours	:	[2]	Th. :	[2]	Pra. : [0]	Prerequisites	:	30202101

This course is specifically designed for students in the Information and Cyber Security program and the topics covered are as follows: Axioms for the natural numbers, divisibility, greatest common divisors, Euclidean algorithm, prime numbers, fundamental theorem of arithmetic, congruencies and Fermat's little theorem, Euler's Phi function, Chinese Remainder Theorem.

Course Name	:	Data Structures				Course Number	:	AR211
Credit Hours	:	[3]	Th. :	[3]	Pra. : [0]	Prerequisites	:	30801203

This course provides students an appreciation to the fundamentals of computer science. Models and applications of data structures including heaps, search trees, hash tables and disjoint sets are introduced and evaluated. Mathematical tools for analysis of algorithms and data structures are discussed and applied.

Course Name	:	Design and Analysis of Algorithms				Course Number	:	AR212
Credit Hours	:	[3]	Th. :	[3]	Pra. : [0]	Prerequisites	:	AR211

This course is to design efficient computer algorithms, proving their correctness, and analyzing their running times. It includes mathematical analysis of algorithms (summations and recurrences), advanced data structures (balanced search trees), algorithm design techniques (divide-and-conquer, dynamic programming, and greedy algorithms), graph algorithms (breadth-first and depth-first search, minimum spanning trees, and shortest paths).

Course Name	:	Data Structures and Algorithms Lab.				Course Number	:	AR214
Credit Hours	:	[1]	Th. :	[0]	Pra. : [3]	Co-Prerequisites	:	AR212*

Object Oriented Programming Skills Recap, Arrays, Array Implementation of Stack and Applications, Linked List, Array Implementation of Queue and Applications, Linked List and Applications, Double Linked List and Applications, Linked List Implementation of Stack and Queue, Circular Queue and Application, Collections, Maps (Hash Table), Binary Tree and Binary Search Tree, Recursion, Searching Algorithms, Sorting Algorithms, Graph Representation, Implementation and Applications.

Course Name	:	Digital Logic Design				Course Number	:	30102212
Credit Hours	:	[3]	Th. :	[3]	Pra. : [0]	Prerequisites	:	30801101

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	:	Digital Logic design Lab.	Course Number	:	30102213
Credit Hours	:	[1] Th. : [0] Pra. : [3]	Prerequisites	:	30102212

Digital Logic Gate (AND, OR, NAND, NOR, XOR), Simplification of Boolean Functions, Combinational Circuits, Code Converters, Decoder, Design with Multiplexers, Adder and Subtractor, Flip-Flops, Sequential Circuits, Counters, Shift Registers, Serial Addition, Memory Unit, Clock-Pulse Generator, Parallel Adder And Accumulator.

Course Name	:	Computer Networks (1)	Course Number	:	ICS230
Credit Hours	:	[3] Th. : [3] Pra. : [0]	Prerequisites	:	ICS281

Open System Interconnection (OSI) Reference Model, TCP/IP Reference Model, Physical Layer, Data Link Layer, Network Layer, Transport Layer, Session Layer, Presentation Layer, and Applications Layer. LAN and WAN Architectures. Network Design, Management and Security.

Course Name	:	Computer Networks (1) Lab.	Course Number	:	ICS232
Credit Hours	:	[1] Th. : [0] Pra. : [3]	Prerequisites	:	ICS230

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.

Course Name	:	Database Design and Management 1	Course Number	:	30801243
Credit Hours	:	[3] Th. : [3] Pra. : [0]	Prerequisites	:	AR211

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	:	Database Design and Management Lab. 1	Course Number	:	30801244
Credit Hours	:	[1] Th. : [0] Pra. : [3]	Prerequisites	:	30801243

Introduction to SQL and environment setup, Working with SQL to query database , create and manage users, Creating schema, DDL statements including CREATE , DROP and ALTER statements , DML including INSERT, UPDATE and DELETE statements, TRUNCATE statement, Retrieving data using the SELECT statement, Restricting and sorting data, Working with single-row functions, Conversion functions and conditional expressions, Reporting aggregated data using the group functions, Displaying data from multiple tables, using subqueries to solve queries, Set operators.

Course Name	:	Computer Networks (2)				Course Number	:	ICS337
Credit Hours	:	[3]	Th. :	[3]	Pra. : [0]	Prerequisites	:	ICS230

This advanced networking course will equip the student with a deep knowledge of network concepts, protocol design, and performance analysis that make the Internet work, will help to develop critical insight into their design, and obtain a firsthand feel for implementation through homework and project exercises. Another key goal is to prepare the student to do research in the field of networking. Additional protocols from the OSI and telecommunications/ATM world will also be featured to provide in-depth comparative studies.

Course Name	:	Operating Systems				Course Number	:	30102324
Credit Hours	:	[3]	Th. :	[3]	Pra. : [0]	Prerequisites	:	AR211

Principles, purpose and structure of operating systems; processes, threads, and multi-threaded programming; CPU scheduling; synchronization, mutual exclusion; Deadlock, memory management and virtual memory; device management; file systems, security and protection.

Course Name	:	Networks Security				Course Number	:	ICS346
Credit Hours	:	[3]	Th. :	[3]	Pra. : [0]	Prerequisites	:	ICS337

Comprehensive Overview of Network Security, Principles of Network Security, Intrusion Detection and Prevention Systems, Firewalls, Security Overview, Authentication Techniques, Attacks and Malicious Software Code, Network Security, Software Security and Trusted Systems, Denial of Service Attacks, Web Security, Monitoring, Auditing, Intrusion Detection, Intrusion Prevention, and Ethical Penetration Testing. Emphasis Is on Methods to Identify System Vulnerabilities and Threats and Prevent Attacks.

Course Name	:	Networks Security Lab.				Course Number	:	ICS348
Credit Hours	:	[1]	Th. :	[0]	Pra. : [3]	Prerequisites	:	ICS346*

Hands-on experiences and practical skills obtained from working on lab assignments are an organic part in the teaching of the Network Security class for students to understand the underneath theoretic parts.

Course Name	:	Mobile Application Development				Course Number	:	ICS339
Credit Hours	:	[3]	Th. :	[2]	Pra. : [3]	Prerequisites	:	30801203

Mobile Phones and Network Technologies, Introduction to android Programming, android Application Frameworks, Building A Simple User Interface, Activities and Intents, Services, Broadcast Receivers, Data Persistence, Processes and Threads, Asynchronous Tasks. Internet Resources, App Publishing and Business Models.

Course Name	:	Digital Forensics				Course Number	:	ICS443
Credit Hours	:	[3]	Th. :	[2]	Pra. : [3]	Prerequisites	:	ICS346

Fundamentals of Digital Crimes and Network Forensics, Forensic Duplication and analysis, Network Surveillance, Intrusion Detection and Prevention, Incident Response and Trace-Back. Signature and anomaly Based Intrusion Detection, Pattern Matching Algorithms, Viruses, Trojans and Worms Detection. Multicast Fingerprinting, anonymity and Pseudonym. Privacy-Protection Techniques, Cyber Law, Computer Security Policies and Guidelines, Court Testimony and Report Writing, and Case Studies.

Course Name	:	Risk Management				Course Number	:	ICS445
Credit Hours	:	[3]	Th. :	[3]	Pra. : [0]	Prerequisites	:	ICS346

Information Technology Security Management and Systems Risk Management, IT Security Control, Plans, and Procedures. Classes of Threats, Existing Risk Management Frameworks, Models, Processes, and tools to Equip Students with the theory, Science, and Practical Knowledge to Operationalize Risk Management in Private and Government Agencies, Vulnerabilities and Risks, Risk Identification, Risk Assessment, Prevention, Mitigation, Recovery.

Course Name	:	Penetration Testing				Course Number	:	ICS441
Credit Hours	:	[3]	Th. :	[2]	Pra. : [3]	Prerequisites	:	ICS346

Introduction to the Principles and Techniques Associated with the Cybersecurity Practice Known as Penetration Testing or Ethical Hacking. The Course Covers Planning, Reconnaissance, Scanning, Exploitation, Post-Exploitation, and Result Reporting. The Student Discovers How System Vulnerabilities Can Be Exploited and Learns to Avoid Such Problems.

Course Name	:	Cyber Law and Ethics				Course Number	:	ICS442
Credit Hours	:	[3]	Th. :	[3]	Pra. : [0]	Prerequisites	:	ICS346

Implementation of Information and Cyber Security Practices, Application of International Law, Legal Considerations Related to Cyber Security and Cyberspace Such as Privacy, Intellectual Property, Cybercrime, Homeland Security, and Global Cyber Security Issues, Develop Business and Governmental Policies, Cyber Security Controls.

Course Name	:	Graduation Project (1)				Course Number	:	ICS471
Credit Hours	:	[1]	Th. :	[-]	Pra. : [-]	Prerequisites	:	+90 Credit Hours.

This course is the first part of a sequence of two courses that constitute the BSc graduation capstone project. Students to communicate, present, and exhibit significant knowledge and understanding of a project idea that demonstrates knowledge, application, analysis, synthesis, and evaluation of information gained throughout their study. At the end of this semester, students expected to submit a proposal of their project.

Course Name	:	Graduation Project (2)				Course Number	:	ICS472
Credit Hours	:	[2]	Th. :	[-]	Pra. : [-]	Prerequisites	:	ICS471

This course is the second part of a sequence of two courses that constitute the BSc graduation capstone project. The student is expected to be engaged in group work and put into action their knowledge gained from the different courses in their study plan through a graduation project.

Course Name	:	Training for Cyber Security Students				Course Number	:	ICS474
Credit Hours	:	[6]	Th. :	[-]	Pra. : [-]	Prerequisites	:	+90 Credit Hours.

Student should register as trainee in Information and Cyber Security sector. The registration must have the department approval. The purpose of the supervised field training experiences is for student to synthesize the knowledge and skills developed during his academic portion of the program in a practical setting. The expectation is that the field training will provide learning opportunities unavailable in a classroom setting. The student's field training faculty advisor monitors student progress and provides them with on-site supervision and support. The 6 credit hours are equivalent to 280 training hour.

Course Name	:	Systems Analysis and Design				Course Number	:	ICS335
Credit Hours	:	[3]	Th. :	[3]	Pra. : [0]	Prerequisites	:	AR212

Overview, system concepts, system development life cycle, system analysis, preliminary investigation & information gathering, feasibility study & cost/benefit analysis, structured analysis, system design, introducing system design, system design activities, DFDS, system implementation, system testing and quality assurance, implementation and software maintenance.

Course Name	:	Web Security				Course Number	:	ICS440
Credit Hours	:	[3]	Th. :	[3]	Pra. : [0]	Prerequisites	:	ICS346

Web Fundamentals, Web Server Architecture, Web Application Hacking, Infrastructure Mapping and Profiling, Web Authentication & Authorization, Script Hacking and Defensive Coding, Securing Databases and Database Access, Buffer Overflow Attacks Denial of Service, Client Security, Threat Modeling.

Course Name	:	Advanced Cryptography				Course Number	:	ICS344
Credit Hours	:	[3]	Th. :	[3]	Pra. : [0]	Prerequisites	:	ICS244

This course gives a thorough introduction to more advanced topics in modern cryptography, encompassing proper security models, cryptanalysis, implementations attacks and advanced functionalities such as computing on encrypted data, cryptocurrencies and post-quantum cryptography.

Course Name	:	Internet of Things Security				Course Number	:	ICS347
Credit Hours	:	[3]	Th. :	[3]	Pra. : [0]	Prerequisites	:	ICS346

Introduction to IOT Security, IOT Ethics and Privacy. Building Automation and Security. Relevant Case Studies of IOT Security Vulnerabilities and Attacks, and Mitigation Controls. Use of IOT in Various Domains: Energy and Environment, Infrastructure Healthcare and Consumer Electronics

Course Name	:	Secure Software Engineering				Course Number	:	ICS444
Credit Hours	:	[3]	Th. :	[3]	Pra. : [0]	Prerequisites	:	ICS339

The course will go through all the phases in the secure software development lifecycle (requirements, design, implementation and testing) focusing on how to incorporate security in each phase and what techniques to use. The main focus is on web-based applications, mobile apps, and cloud security

Course Name	:	Cloud Computing Security				Course Number	:	ICS448
Credit Hours	:	[3]	Th. :	[3]	Pra. : [0]	Prerequisites	:	ICS346

Cloud Computing Architecture and Security, Current Technologies and Solutions, analyze New and Emerging Cloud Solutions, Identify and Evaluate Cloud Computing Architectures, Cloud Architecture Models, Cloud-Based Services, Threats, Components (Logical and Physical), and Security Issues and New Challenges of Cloud Computing.

Course Name	:	Policy Design and Analysis				Course Number	:	ICS446
Credit Hours	:	[3]	Th. :	[3]	Pra. : [0]	Prerequisites	:	ICS346

General Overview of Policies, Policy Lifecycle, and Writing Security Policies, Information Classification and Privacy Policies. Network Security and Email Policies. Application, Operating System and Software Security Policy. Encryption and Key Management Policy, Disaster Recovery and Business Continuity, Security Policy: Audit and Compliance, Acceptable Use Policies and Training /Awareness, Enforcement and Effectiveness.

Course Name	:	Cyber intelligence and Auditing				Course Number	:	ICS447
Credit Hours	:	[3]	Th. :	[3]	Pra. : [0]	Prerequisites	:	ICS346

Fundamental Knowledge of Cyber Security, Audit and Control Processes, Control Framework, Legal and Ethical Issues for IT Auditors, Audit Planning, IT Service Delivery, Network Telecommunications Auditing, Application Auditing, Fraud and Forensic Auditing, E-Business Auditing, ISO Auditing, PCI Auditing, GLBA Auditing, HIPAA Auditing, and SOX Auditing.

Course Name	:	Special Topics in Information and Cyber Security				Course Number	:	ICS449
Credit Hours	:	[3]	Th. :	[3]	Pra. : [0]	Prerequisites	:	+90 Credit Hours

Students Are Introduced to Advanced Selected topics in Different Areas of information and cyber security that not Covered in Other Courses. The topics Covered Vary from Year to Year, Depending on Department's Council Approval.

Course Name	:	Discrete and Mathematical Structures				Course Number	:	30801214
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	:	Probability and Statistics				Course Number	:	30202131
Credit Hours	:	[3]	Th. :	[3]	Pra. : [0]	Prerequisites	:	30202101

Descriptive statistics, Probability; axioms of probability, rules of probability, conditional probability, independence. Discrete and continuous random variables, expectation, probability distributions. Sampling distributions; t and Chi square and F distributions, CLT. Point estimation: for mean and variance, the difference between two means and the ratio of two variances, testing hypotheses for small, large and dependent samples, correlation, simple linear and multiple regression. Goodness of fit tests.