Brief Course Descriptions

Course Title & No.	Brief Course Description
Introduction to Programming 0102220	This course introduces principles of computer programming using Java as a programming language. The course introduces the concept of algorithms and trains students to compile, run and debug java programs. Also, the course includes topics such as simple data types; operators and expressions; variables; input and output; control structures (conditional and repetition statements); methods; libraries; arrays and some of their applications.
Object-Oriented Programming 0102221	This course provides students with deep understanding of object oriented programming concepts. Topics covered include classes, objects, Instantiation, methods, and instance variables, I/O, encapsulation, static fields and static methods, overloading, constructors, scope of declarations, overriding, composition, Java API packages, inheritance, garbage collection, polymorphism, final methods and final classes abstract classes and methods, interfaces, and introduction to GUI.
Computer Organization 0102240	This course introduces the fundamentals of computer organization and machine architecture. It covers logical components and circuits, data representations, register transfer, bus and memory transfers, arithmetic microoperations, logic microoperations and shift microoperations, instruction codes, registers, common bus system, timing and control, instruction cycle, register-reference instructions, memory-reference instructions, I/O instructions, design control logic circuits for Basic computer, programming the Basic computer, addressing modes, stack, organization main memory, DMA, I/O, pipelined datapath, execution of pipeline microoperations, pipelined control, RISC, and CISC.
Data Structures and Algorithms 0102270	This course introduces the main concepts of data structures and algorithms. Topics covered: concepts of Abstract Data Types (ADT), specification of different ADT structures such as: (Bags, Lists, Stacks, Trees and Graphs), Array and Linked Data implementations of these ADTs using object oriented approach, and analyzing algorithm's efficiency in term of time and space storage. In addition, the course will introduce recursion as simple technique for solving complex problems and a detailed comparison of various sorting and searching algorithms.
Introduction to Artificial Intelligence 0102380	This course aims to introduce artificial intelligence as an important tool to facilitate learning and reasoning about the world. It covers different topics including: the nature of intelligence; Problem solving techniques including a game playing examples; Knowledge and Reasoning including Planning and acting in the Real World; Uncertain Knowledge and Reasoning including making decisions; and some concepts about learning in real life.
Database Systems 0102330	This course introduces the basic concepts of databases, which include database system architecture; entity-relationship model; hierarchical, network, and relational data models; functional dependencies and normal forms. Design, implementation, and optimization of SQL query languages with basic relational algebra; and security and integrity.
System Analysis & Design 0102331	This course introduces the object-oriented analysis design using Unified Modeling Language (UML), which includes the unified process development cycle; use case analysis; dynamic and static diagrams; object oriented principles (encapsulation, inheritance, polymorphism), design principles (coupling and cohesion) and design patterns. The course includes a large-scale software-development project.
Operating Systems 0102340	This course covers the basics of operating system concepts starting from its history. The course covers the Processes including process and threads scheduling, inter-process communication, critical section problem, and CPU scheduling It also covers the concepts of Input/output including principles of I/O hardware and software, disk arm scheduling and deadlocks; Memory management including swapping, paging, virtual memory and page replacement algorithms; File systems including File system structures, access, protection and i-nodes. Some examples of operating systems will be introduced.
Formal Languages and Automata Theory 0102341	The course introduces fundamental concepts in automata theory and formal languages including finite automata (deterministic and non-deterministic finite accepters), regular expressions, regular grammar, regular and non-regular languages, pushdown automata, context-free languages and Turing machine.

Web Development **0102420**	This course introduces the basics programming and scripting languages for the Web development. It covers basic concepts of the World Wide Web (WWW), HTML 5, CSS 4, JavaScript 1.8, XML, and PHP 7. The course starts with a general introduction about the fundamentals of WWW and the web programming tools. First, it introduces HTML and XHTML basic syntax, XHTML document structure and text markup, images, Hypertext links, lists, tables, forms, and frames. Second, the course covers Cascading Style Sheets (CSS) including levels, style specs, font and list properties, color and alignment of text. Then, basics of JavaScript are discussed including syntactic characteristics, primitives, operations, expressions, screen output and keyboard input, and control statements. PHP is discussed along with syntactic characteristics, primitives, operations, expressions, output, control statements, arrays and simple functions. Finally, review the basic statements of SQL (DDL, DML) and use MySQL with PHP.
Programming Languages and Compliers **0102421**	This course introduces students to the fundamental concepts of compilers. It covers compiler architectures, data types and representation, grammatical production process, properties of grammars, grammar formalism, lexical analysis, lexical versus syntactic analysis, creating a lexical analyzer, transition table compression, symbol tables, bottom-up parsing, top-down parsing, exception handling, Symantec analysis, code generation, preprocessing the intermediate code, optimization techniques, general optimization, code size reduction, and power reduction and energy saving.
Computer Networks **0102450**	This course introduces computer network uses, computer network components and classifications. Further this course covers computer network architectures, network Layers; network access; physical layer and data link layer, network layer, transport layer and application layer. Furthermore, the course will introduce IP Addressing, sub-netting and computer network security.
Introduction to Distributed Systems **0102451**	This course introduces the theory of distributed systems, including types and characteristics of distributed system, architecture of distributed system; centralized, decentralized and hybrid architecture. The course also covers communication models of distributed systems, coordination of distributed system, consistency and replication and replication protocols.
Computer Ethics **0102453**	This course addresses a definition of ethics, provides a framework for making ethical decisions, and analyzes in detail several areas of ethical issues that computer professionals are likely to encounter in the workplace. Topics include philosophical, business and professional ethics, software reliability, intellectual property, copyrights, privacy, data mining, and computer security.
Introduction to Computer Graphics **0102460**	This course introduces basic concepts of computer graphics. It includes graphics geometry, primitives, two- and three-dimensional representations. It also covers geometric transformations, window clipping, and computer animation. OpenGL is used to illustrate the techniques and algorithms covered in the course.
Simulation and Modeling **0102480**	This course covers Modeling and Simulation Process principles; data collection and analysis; Monte Carlo simulation; event scheduling; dealing with uncertainty; confidence intervals; Terminating and steady state analysis; and Input Distribution Modeling. The course will use MATLAB to conduct the modeling and simulation techniques and learned algorithms.
Data and Web Mining **0102481**	The course introduces principles and techniques of (Web) data mining. Topics include: different data mining techniques such as classification, prediction, clustering and reasoning. The course goes through the cycle of data mining starting from collecting the data all the way to evaluating and interpretation the results. Some challenges are covered that are concern with Web data mining in particular such as data integration for e-commerce, Web data warehousing, and Web personalization and recommender systems. The course will use Weka as a data mining tool.
Foundations of Software Engineering **0103220**	This course introduces basic concepts of software engineering by focusing on software engineering process: development and maintenance. The course covers the software engineering lifecycle models and deliverables; requirements analysis and specification; architectural and detailed design; verification and validation and software maintenance issues.

Software Requirements and Specification 0103320	This course introduces requirements engineering within software life-cycle: requirements elicitation and modeling issues and techniques; documentation and management of requirements; standards and CASE tools; cognitive and socio-organizational issues
Software Design and Development 0103330	The Software Design and Development course is designed to teach students the knowledge, understanding, skills and values to solve problems through the creation of software solutions. The course introduces students to the nature of software design, design process, agile-based design, architectural design and distributed architecture. It also introduces popular design frameworks, such as object-oriented design, function-oriented design, and aspect-oriented design. The course is concluded with user interface design and its contemporary design issues.
Formal Specifications and Design Methods 0103331	Complex and large software system often have complicated control structures involving concurrency and real-time interactions, which makes their development a challenging task. One of the best method of developing these kind of systems is using mathematical and logical tools (so-called formal methods). In this course, we will study formal methods in detail and their usage in requirements specification and software design. The course will start with introduction of formal specification, algebraic specification, and specification in Z language. Requirements and design strategies using Z language will be taught in detail. Design formal methods such as state charts and Petri-net models will also be covered thoroughly. The course will also introduce students with Alloy, B-Method and B-Event method to specify and design complex systems. Object-Oriented formal language, OCL, will be taught with implementation on real-life complicated systems. The course will be concluded with software verification and validation methodologies.
Software Project Management 0103420	This course develops the basic principles of project management, including concepts from the initiating, planning, executing, monitoring & controlling, and closing process groups. Introduces fundamentals from the ten project management knowledge areas: integration, scope, time, cost, quality, human resources, communications management
Object-Oriented Analysis and Design 0103430	This course introduces the object-oriented analysis and design, which includes the Unified Process development cycle; object oriented principles (encapsulation, inheritance, polymorphism), use case analysis; Unified Modeling Language (UML), dynamic and static diagrams; design principles (coupling and cohesion) and design patterns. The course includes a large-scale software-development project.
User Interface Design 0103431	In this course, students will learn principles of designing, developing and testing appealing and effective user interface (UI) and user experience (UX) for desktop, web and mobile applications. They will learn about UI and UX design patterns, usability testing, and learnability. Issues and guidelines of designing modern and contemporary interfaces of small screened devices, such as Android and iPhone, will also be part of the course. The growing field of Big data demands effective data visualization on modern devices. We will learn methods and best practices to present such information in an effective manner on the applications along with creation and testing of modern Dashboards.
Software Measurement and Testing 0103440	This course is an introduction to software testing and metrics within the context of software quality engineering: module and unit testing; integration and acceptance testing; quality factors and metrics; verification and validation; review and inspections; reliability, security and safety assurance; and automated software testing.
Software Evolution and Maintenance 0103441	This course provides concepts and advanced technologies in software evolution: Program comprehension; construction of reusable software; separation of concerns; techniques for reverse engineering and re-engineering software; design for change layered design and incremental; and also analyze an existing system, explore possible change strategies, and construct a plan for evolving each of the systems major components.
Circuit Analysis I 0104230	This course is an introduction to linear circuit analysis. Topics include Ohm's law; Kirchhoff's laws; resistor combinations; nodal and loop analysis techniques; superposition theorem; source transformation; Thevenin's and Norton's theorems; maximum power transfer; capacitance and inductance; first- and second-order transient analysis.
Digital Logic Design 0104240	This course presents the theory of number systems, binary arithmetic, Boolean algebra, digital circuits and systems, stressing techniques for the analysis and synthesis of combinational and sequential logic systems. It covers the operations of basic logic gates, examples of some combinational and sequential circuits such as adders, subtractors, decoders, encoders, multiplexers, de-multiplexers, latches, flip-flops, counters and shift registers.

Computer Architecture 0104242	This course introduces the fundamental concepts of computer architecture. It covers computer abstractions, operations of the computer hardware, representing instructions in the computer, MIPS addressing for 32-Bit immediate and addresses, parallelism and instructions synchronization, arithmetic for computers, floating Point, parallelism and computer arithmetic, the processor, building a data path, pipelined data path and control, data hazards and control hazards, memory technologies, basics of caches, measuring and improving cache performance, virtual machines, virtual memory, and parallel processors.
Circuit Analysis II 0104330	This course covers sinusoidal steady-state circuit analysis including phasors, impedance, admittance and analysis techniques; steady-state power analysis including instantaneous, average, and complex power; mutual inductance and transformers; frequency response; resonant circuits; passive filters; and two-port networks.
Electronic Circuits 0104331	This course covers diode circuits and applications; Field-Effect Transistors (FET) and Bipolar Junction Transistors (BJT); DC biasing of amplifiers; small signal models for transistors; the types of single-stage amplifiers; and multistage amplifiers.
Digital Electronics 0104333	This course discusses digital design techniques for integrated circuits. Emphasis is on the design of logic gates and circuits at the transistor level. A number of different logic families are described, including CMOS, ECL, TTL, and BiCMOS.
Microprocessor and Assembly Language 0104350	This course covers: the architecture of the microprocessor, microprocessor instructions, assembly language, basic I/O and memory interfaces.
VLSI Systems and Design 0104430	This course introduces VLSI design in CMOS technology, and provides a background on CMOS layout and physical design. The theory of MOS transistors is addressed along with characterization and performance estimation of CMOS circuits. In addition, the course covers array subsystems including decoders and memory systems, and provides an introduction to Verilog and VHDL to be used to design and simulate a finite state machine. Lab sessions are required.
Digital Systems Design 0104440	This course covers the concepts of sequential logic including Finite State Machine (FSM) models (Mealy and Moore), state transition tables and state diagrams. The course addresses FSM implementation with D and JK flip-flops, and design issues with regard of state reduction in FSMs and incompletely specified sequential circuits. The topic of Algorithmic State Machines (ASMs) is also addressed as well as asynchronous circuits and hazards. Throughout this course, the students learn a Hardware Description Language such as VHDL or Verilog to be used in designing with programmable logic (e.g. PLD, ROM, FPGA.) Lab sessions are required.
Advanced Computer Architecture 0104441	This course covers advanced concepts in computer architecture. Topics include instruction set architecture, pipelining, instruction-level parallelism, caches and virtual memory design, input/output systems, multiprocessors, and SIMD.
Real-Time Embedded Systems 0104450	Basic architecture and assembly language of a microcontroller, Principles of microprocessor serial and parallel interfacing, Counters, Timers, ADC and DAC relevant chips, Software and hardware interrupt handling routines, Data acquisition, Human and physical interfaces, Application of top-down design to microcontroller software development in assembly language and a high level language, Evaluation of hardware and software trade-offs.
Computer Network Protocols and Applications 0105400	This course introduces concepts and principles in today's networks and various aspects of computer networking, including layered network architecture, TCP/IP suite, client-server and P2P paradigms, application layer protocols application layer protocols (e.g. HTTP, FTP, SMTP, POP3, IMAP, and DNS), packet delay, packet loss, throughput in packet switched networks, transport layer protocols (TCP/UDP), reliable data transfer, flow control and congestion control, IPv4/IPv6 addressing, subnetting, CIDR, IP packet delivery and routing, Internet Control Message Protocol (ICMP), Dijkstra algorithm, OSPF, RIP, BGP.

Cryptography and Computer Network Security **0105410**	This course introduces the basics of cryptography and its application to computer-network security services and mechanisms. It covers an overview of network security, security attacks, security services, security mechanisms, symmetric cipher, substitution techniques, transposition techniques, rotor machines, steganography, block cipher principles, differential and linear cryptanalysis, Data Encryption Standard (DES), Simplified-DES, Euclidean Algorithm, modular arithmetic, finite fields of the form GF(p), polynomial arithmetic, finite fields of the form GF(2^n), Advanced Encryption Standard (AES), Simplified-AES, asymmetric cipher model, principles of public-key cryptosystems, RSA Algorithm, digital signatures, mutual authentication and key distribution protocols (ex. Needham Schroeder protocol), Message Authentication Codes (MACs), and web security issues.
Computer Network Management **0105411**	Introduction to methods, techniques and tools for the management of computer networks. Topics include: SNMP network management; OSI network management; CMIP; Web-based Network Management; Remote Monitoring (RMON, RMON2). Issues to be addressed include: configuration and name management, fault and performance management, security, and accounting management.
Network Programming **0105420**	This course introduces the students to the basic concepts of networks programming using Java programming language and its network libraries. The course covers the TCP/IP protocol stack, Internet Addressing and URL, Client-Server Model, Peer-to-Peer Model , I/O Streams, TCP Sockets, UDP Sockets, Multithreading and Multiplexing, Secure sockets, File Handling, Non-Blocking I/O, RMI, CORBA, Servlets, and Web Services.
Mobile IP **0105421**	This course focuses on IP-based mobile telecommunications, especially with Mobile IPv6 protocol. The course topics include the concepts of mobile nodes, mobile agents, home agent discovery, binding with node/agent actions, IP security for mobile nodes and their home agents, and the operation of Mobile IPv6 with Internet Multimedia Subsystem (IMS) and Session Initiation Protocol (SIP).
Advanced Networks **0105520**	This course presents various advanced topics in computer networks. The course covers broadcast and multicast routing, Multiprotocol Label Switching (MPLS), IPv6, wireless LANs, cellular Internet access, mobile IP, Voice over IP, Best-Effort IP Service, network support for multimedia, Quality of Service (QoS), Integrated Services Architecture (ISA), Differentiated Services, IP performance metrics, Software Defined Networks (SDNs), cloud computing.
Data and Computer Communications **0106320**	This course provides an overview of data communication and networks. Topics include: Network topologies, Network models and devices, Data transmission and mediums, Multiplexing, Signal encoding, Error detection and correction techniques, Physical and Data Link Control layers' issues.
Signals and Systems Analysis **0106330**	This course covers the followings topics: Continuous- and discrete- time signals and system, Continuous and discrete linear time-invariant systems. Fourier Analysis: Fourier series and Fourier Transform. Laplace Transform and Z- transform.
Random Signals and Systems **0106331**	This course includes discussion of probabilistic models, conditional probability; vectors of random variables; distributions and density functions; expectations and characteristic functions; independence; laws of large numbers; central-limit theorem; random process concepts; random signal analysis concepts
Introduction to Communications Systems **0106340**	This course includes a review of signals, linear systems and Fourier theory, signals bandwidth and spectra, an analysis of analogue modulation systems (AM, PM and FM), synchronizations, characterization and effect of noise, transceiver architectures of analog systems, and overview of pulse code modulation
Electromagnetic Theory **0106350**	This course introduces the basic concepts and mathematics of the classical Electromagnetic Theory. Topics include vector algebra, coordinate systems, a discussion of static electric field dielectrics, polarization, field distributions of charges, steady electric currents, field at boundary conditions, and Maxwell's equations. Prior knowledge of vector calculus, differential equation and undergraduate level electromagnetic theory is required.
Digital Signal Processing **0106430**	This course includes a review of discrete-time signals and systems properties and representation, sampling of continues time signals. The course will cover digital processing of continuous-time signals, a review of Z-transform, frequency response and impulse response for linear time invariant systems. It also covers the design of Finite impulse response (FIR) filters and infinite impulse response (IIR) filters. Discrete Fourier Series and Discrete Fourier Transform (DFT). Fast Fourier Transform (FFT). Fourier analysis of signals using Discrete Fourier Transform.

Digital Communication **0106440**	This course reviews probability, random variables and signal representation. It also introduces the power and energy analysis for signals using time domain and frequency domain. The course introduces the concept of data formatting, sampling theory, Nyquist Criteria, uniform and non-uniform quantization, digital Modulation/ Demodulation techniques for baseband and band-pass signals, Inter-symbol-interference (ISI) and Equalization channel coding/decoding methods and techniques
Wireless Communications Fundamentals **0106441**	This course covers: Transmission fundamentals; RF wave propagation, Channel characterization, Multiple Access techniques; Spread spectrum; Wireless cellular concepts.
Antennas **0106450**	The course introduces the fundamental principles of antenna theory and electromagnetic radiation. Topics include: Antenna parameters; Radiation Integrals; Dipole and Loop antennas; Travelling-wave antennas; Aperture and Microstrip patch antennas; Linear and planar antenna arrays.
Optical Communications **0106451**	This course introduces the fundamental principles of optical communications. topics include: principles of fiber optics, system components, optical fiber modes and configurations, design and performance issues of optical communication links and systems.
Satellite Communications **0106550**	Historical perspective, orbital mechanics and constellations, satellite space segments, satellite propagation, link budgets, satellite access techniques
Calculus 1 **0107101**	Topics in this course include a brief review of functions, foundation of trigonometry functions and its graphs, Limits and continuity, the concept and methods of Differentiation, curve sketching, maximum-minimum problems, related rates, Mean Value Theorem, the concept of anti-derivative, Riemann integral, logarithm, and exponential functions
Linear Algebra **0107102**	Linear equations, Gaussian elimination, Matrices, Algebraic properties of matrix operations, determinants, vector spaces, subspaces, basis and dimensions, Linear dependence and independence, Linear transformations, eigenvalues and eigenvectors.
Probability Theory and Statistics **0107103**	This course covers the fundamental principle of probability, discrete probability distributions and continuous (i.e. normal) distribution. Also, this course covers a progression of topics from introduction to statistics, constructing and interpreting graphs, measures of central tendency, measures of dispersion (or variation), measures of position, linear regression and correlation analysis and estimating single population parameters (confidence interval estimation). Applications and problem solving are emphasized.
Calculus 2 **0107104**	This course covers the following topics: applications of definite integrals to calculate volumes and lengths of plane curves, and area of surfaces of revolution, techniques of integration, first order differential equations, infinite sequences and series, power series, parametric equations, polar coordinates, vectors and the geometry of space.
Discrete Structures **0107200**	The course covers how to formulate and represent problems mathematically, think logically and apply mathematical techniques for solving such problems. To this end, students will learn logic and proof, sets, functions, induction and recursion. The course will also cover some combinatorial principles and methods such as counting, permutation and combination. Key topics involving discrete probability, Boolean algebra, graphs and trees are also covered.
Introduction to Numerical Methods **0107201**	This course provides an overview of the practical experience in utilizing algorithms for solving numerical problems arising in applied sciences. Topics covered will include solution of linear and nonlinear systems, curve fitting and least square line, numerical differentiation and integration, solution of differential equations and system of linear Algebraic equations, Interpolation and polynomial approximation. Computer software will be utilized in solving problem assignments.

Engineering Math **0107202**	In this course, students have the opportunity to be introduced to ordinary differential equations (ODEs) which can be used in many engineering applications. This course also provides an introduction to Laplace transform that may have a useful role in circuit analysis and control. There are other important topics covered in this course such as vector analysis and complex calculus which can be used in solving such engineering problems (e.g. fluid mechanics, thermodynamics, etc.).
Physics I **0108103**	This course covers: Introduction to the concepts of vectors, motion in one dimension, motion in two dimensions, Newton's laws of motion, circular motion, work and energy, and potential energy.
Physics I Lab **0108104**	The experiments in this course serve to reinforce the concepts of mechanics: kinematics, force, energy, and momentum. In addition, this course aims to introduce the basic skills in conducting experiments, handling basic equipment; and build necessary concepts of data analysis and error correction.
Physics II **0108203**	This course gives view of electric charge and electric field, Coulomb's Law, Gauss's Law and its applications, Capacitance and dielectric, Current and Resistance, Ohm's Law, Direct Current circuits, Kirchhoff's rules, and Magnetic fields.
Physics II lab **0108204**	The experiments in the course serve to reinforce the concepts of Electric charge, electric field, Coulomb's law, Gauss's law and its applications, Capacitance and dielectric, Current and resistance, Direct current circuits, Magnetic fields, Source of magnetic field and Faraday law. In addition, this course aims to introduce basic skills in conducting experiments, handling basic equipment, and building necessary concepts of data analysis and error correction.
Computer Aided analysis and Design **0111200**	The course introduces the representations and analysis of systems of orthographic projection and graphical methods used in engineering design and production. It also covers Introduction to CAD, Mechanical Design Process, Basic Part CAD modeling, Complex Parts and Surfaces, Detailing and Blueprint Creation, Introduction to AutoCad, Assembly, Engineering Property and File Creation, Design Project correlated with technical sketching.
Statics **0111210**	This course gives view of Forces; Free Body Diagrams; Equilibrium of Simple Objects; and Machines and Structures Joined by Engineering Connections, Trusses, Friction, and Moments of Inertia.
Mechanics of Materials **0111211**	Syllabus is not exist This course gives view of the Analysis of stresses, Analysis of Strain, Stress- Strain relations, Torsion, Bending of Beams, Deflection of Beams, Combined Stresses, Stability of Columns, and springs.
Dynamics **0111212**	This course deals with dynamics of particles and rigid bodies, reviews of momentum and energy principles, applications of free-body diagram, Newton's second law, the work energy principle and the impulse momentum techniques to solve certain dynamic problems.
Geology **0111220**	This course covers the basics of Rock and mineral types, soil properties, rock mechanics, geologic structures, active tectonics and earthquake hazards, slope stability and landslides, groundwater, rivers and flood hazards.
Surveying **0111230**	This course introduces This is an introductory course to plane surveying as related to the construction industry. Emphasis is placed on obtaining field skills in linear measurement and the operation of levels, transits, theodolites and total stations. Elevations, horizontal, vertical, and spiral curves are explored.
Surveying Lab **0111231**	The course includes instruments and tools that students use throughout the surveying course. Students learn techniques for gathering field data with both traditional and modern instruments.

Construction Materials 0111310	General treatment of physical and mechanical properties and engineering behavior of metallic and nonmetallic materials. Steel, aluminum, aggregates, cement concrete, bituminous materials, asphalt concrete, wood. Laboratory testing, instrumentation, and investigation into macro-behavior. Sustainability issues including recycling, energy requirements, and greenhouse gas production associated with the materials
Materials Lab 0111311	This course covers the analysis of engineering components to determine stresses, strains, and deformations using finite element method and experimental techniques.
Structural Analysis 0111312	Covers stability and determinacy of structures; force calculation in trusses; axial load, shear and bending moment diagrams for beams and frames; approximate analysis of indeterminate frames; analysis of cables and arches; deflection calculations; influence lines for determinate structures; and analysis of statically indeterminate structures using classical methods. Uses commercial software for structural analysis.
Design of Steel Structures 0111313	This course introduces the fundamentals of Steel Design of which students familiarize with the advantages and disadvantages of its use, specifications, codes, and anatomy of steel structures. The materials of this course includes other subjects related to the structure and design of steel that make civil engineers well prepared; for instance, bolted and welded connections, compression members, types and behavior of sections for beams, design of cold formed steel, etc.
Geotechnical Engineering 0111320	Studies physical properties of soils, classification systems, soil structure and soil water systems, effective stress principle and stresses in soil due to applied loads. Includes the following topics: compressibility, consolidation and swell; permeability and seepage analysis; soil compaction; stress-strain-shear strength relationships of soils; failure criteria; direct and triaxial shear testing; and soils used in construction. Introduces lateral earth pressures. Uses computer software for geotechnical analysis.
Geotechnical Engi-neering Lab 0111321	This laboratory course is designed to provide insight and experience into Soil Description and Identification, Moisture Content, Sieves and Hydrometer Analysis; Atterberg Limits (Liquid, Plastic and Shrinkage Limits); Compaction; Permeability tests (constant and falling head); Consolidation; Direct Shear; Unconfined Compression test; Triaxial Compression test.
Transportation Engineering 0111330	Characteristics of transportation supply and demand; measuring and estimating demand; social and environmental impacts; planning of transportation systems; characteristics of transportation modes; interaction between modes; mode interfaces; transportation technology; economics; public policy, implementation and management.
Fluid Mechanics 0111340	This class provides students with an introduction to principal concepts and methods of fluid mechanics. Topics covered in the course include: Hydrostatics, continuity, irrotational flow, pressure distributions, weirs and gates, momentum and energy, surface drag, pipe friction, form drag, and pipe fitting losses.
Fluid and Hydraulics Lab 0111341	The course explores the principles of fluid mechanics through laboratory experiments, Investigates, various hydraulic phenomena with both physical and computer models and demonstrates basic civil engineering design principles for pipe networks, open channel systems, and ground water regimes
Reinforced Concrete Design I 0111410	This course describes the fundamentals and types of concrete mixes. Students should be able to understand the basic material properties and basics of reinforced concrete structures. Design of beams and two-way slabs for flexure are introduced. Several additional materials are discussed such serviceability limit states, retaining walls, etc. in which strengths

Foundation Engineering 0111420	The course covers the following topics: Soil Mechanics; Geotechnical Site Characterization; Shallow Foundations; Deep Foundations; Axial Load Capacity of Deep Foundations; and Construction of Deep Foundations
Highway Engineering 0111430	This course is about explores driver and vehicle characteristics, stopping and passing sight distances, cross Section elements, vertical and horizontal alignment, intersections and interchanges, surface drainage, types of pavements, and principles, theoretical concepts and design of flexible and rigid pavements.
Environmental Engineering 0111440	Covers materials balance, reaction kinetics and reactor theory. Introduces water quality parameters, modeling, and source assessment; and planning and design of water and wastewater treatment methods and unit operations. Includes physical, chemical and biological phenomenon governing water and wastewater treatment steps; air quality standards and air quality treatment and control; solid waste planning and management; and hazardous waste treatment and management.
Environmental Engineering Lab 0111441	Includes experiments in environmental engineering, hydraulic engineering and surface and ground water hydrology. Includes sampling, physical, chemical and bacteriological analysis of water and wastewater. Utilizes standard test methods and equipment for measurement of important environment parameters. Covers sampling methods and data presentation. Includes experiments in water surface run off and subsurface infiltration and flow, experiments in closed conduit, open channel tests and related hydraulic structures.
Water Resources Engineering 0111442	Water laws. Reservoirs, dams, and reservoir basins. Hydro- power generation. Flood estimation, routing and control. Engineering economy in water resources planning. Introduction to system engineering in water resources. Topics in arid and semi-arid region water resources. Desertification water conservation techniques, reuse of water, remote sensing and arid water resources. Linear programming and its applications in water resources.
Engineering Economics 0111450	This course addresses the Engineering economics and cost concepts, as well as the time value of money. Topics include worth of investments and economic evaluation of alternative choices, depreciation methods and tax incentives, analysis of public sector projects, risk and uncertainty in economic evaluation.
Internship 0111480	This course provides real world experience in Civil Engineering field. The internship must be off-campus and students must complete at least one semester of work consisting of 240 hours or 20 hours work per week.
Pre-stressed Concrete Design 0111510	This course covers: Flooring and structural systems; Design of reinforced concrete members including beams subjected to torsion, two-way slabs, column under biaxial bending, slender columns, combined footings and shear walls; Pre-stressed concrete, pre-stress materials and losses. Design of pre-stressed beams and computer analysis and design of structures.
Reinforced Concrete Design II 0111511	Design of reinforced concrete foundations, retaining walls, two-way slabs, unbraced slender columns; and prestressed concrete beams
Bridge Engineering 0111512	Introduction to bridge engineering. Historical background of bridges and types. Bridge aesthetics and proportioning. Design process. Ayman Odeh Review of applicable design codes. Loads on bridges and force distribution. Bridge geometry. Conceptual design. Analysis tools for highway and pedestrian bridges. Concrete and steel deck design. Design of substructures such as foundations with or without piles; abutments, retaining walls and wing walls; columns and cap beams; bearings. Introduction to reinforced concrete and prestress concrete principles.

Advanced Geotechnical Engineering 0111520	It introduces mechanical properties of rocks and rock formations. Underground openings in rocks are discussed along with slope stability of stratified formations. Foundations on rocks, rock bolting, and introduction of soil dynamics are introduced. Wave propagation in one and two dimensions in elastic media, seismic waves, foundations subjected to dynamic loading and theory of liquefaction are also explained.
Geographic Information Systems - GIS 0111530	This course introduces the hardware and software components of a Geographic Information Systems and reviews GIS application. Topics include data structures and basic functions, methods of data capture and sources of data, and the nature and characteristics of spatial data and objects.
Waste Water Engineering 0111540	The course covers the following topics: Wastewater and storm water systems; Wastewater generation; Wastewater treatment: physical, chemical, and biological unit processes. Advanced wastewater treatment; and Sludge treatment and disposal.
Air Pollution Engineering 0111541	The course covers the following topics: Types of air pollutants; Sources of air pollutants, effects of air pollutants on health, vegetation, materials, and the atmosphere; Meteorological considerations, dispersion of pollutants in the atmosphere, distribution and cleansing of particle matter, atmospheric photochemical reactions; Particulate pollutant control, source correction, cooling treatment; control of gaseous pollutant, point sources, and their measurement techniques.
Construction Management 0111550	This course explores professional practice as a constructor, requiring an understanding of the working and contractual relationship among all participants in any project process. The course will give an overview of all aspects of managing a project; from initial planning to completion, including budgets, estimating, scheduling, financing and creating contracts and other construction forms as necessary.
Project Management 0111551	Theory, methods and quantitative tools used to effectively plan, organize, and control construction projects; efficient management methods revealed through practice and research; Hands-on, practical project management knowledge from on-site situations and field trip
Special topics in civil engineering 0111581	This course may be offered in 4th or 5th year upon the recommendation of the Department and approval of the College Council. The course contents will be selected to complement the available elective courses.
Capstone I 0111590	A two-semester project that involves a significant design and implementation, and satisfies AAU senior project requirement and the Civil Engineering design requirement.
Capstone II 0111591	
Computer Security Fundamental 0104204	The course will provide the students with principles of data and technology that frame and define computer security and the integral role of cybersecurity professionals. It will provide an insight to topics such as: foundational cybersecurity principles, security architecture, risk management, incidents, attacks, and emerging IT technologies.
Cryptography & Computer Network Security 0105410	This course introduces the basics of cryptography and its application to computer network security services and mechanisms, such as confidentiality, digital signature, access control, and electronic payments. Topics like, analysis of software and hardware implementations of cryptographic algorithms and network-security protocols will also be discussed.

Servers, Datacenters and Cloud **0103455**	Modern hardware and software infrastructure has been evolving rapidly and this module describes the present state both within and outside the enterprise by following themes of hardware; services; maintenance, configuration and monitoring; virtualization and cloud; and finally performance and resilience.
Computer Forensics **0103413**	This course will provide a foundation in the field of Computer Forensics. Topics covered include: cybercrimes and the need for computer forensics, privacy issues, legal codes; risks, vulnerabilities, and countermeasures; The course will also provide best practices for general incidence response, the tools and techniques to perform a full computer forensic investigation, methods and standards for evidence extraction, e-mail investigations, image file recovery, and evidence preservation. Topics such as expert witness testimony and deposition of legal evidence in a court of law may also be covered.
Risk Assessment & Management **0102410**	This course introduces the practical skills necessary to perform regular risk assessments and management. The course covers the following topics: understanding the various risks; performing risk assessment to identify threats and vulnerabilities; effective control and event risk management, risk remediation and response, and long term risk tracking plans. Latest formal Risk Management Models & Tools will be introduced.
Mobile Applications and Security **0102413**	This course covers how to develop and deploy secure mobile applications by implementing an effective mobile device security strategy, identify potential flaws in proprietary and third-party mobile OS applications. Covered topics include: introduction to mobile security management, developing a mobile device security strategy, protecting mobile devices, enhancing mobile data security, integrating security throughout the mobile application development.
Ethical Hacking **0102320**	The course aims to equip students with the technical skills necessary to identify and exploit vulnerabilities in computer systems for the purpose of securing them against the damaging work of hackers. Topics covered include: Ethical Hacking Overview, Network & Computer Attacks, Foot- printing, Social Engineering, Port Scanning, Enumeration, Linux Operating System Vulnerabilities, Hacking Web Servers, and Hacking Wireless Networks. The course also includes hands-on penetration testing on multiple OS such as Unix/LINUX and Windows networks using ethical hacking techniques
Cybersecurity Law & Policy **0102500**	The course broadly covers the national and international policy and legal considerations related to Cybersecurity and cyberspace such as privacy, intellectual property, cybercrime, homeland security (i.e., critical infrastructure protection) and cyber warfare, and the organizations involved in the formulation of such laws and policies. It also casts light on broader technology issues to demonstrate the interdisciplinary influences and concerns that must be addressed in developing or implementing effective national Cybersecurity laws and policies
Capstone Project I **0102494**	This course involves a significant (Final Year) design project that satisfies the AAU senior project requirement and ABET engineering design requirement.
Capstone Project II **0102495**	This course involves a significant (Final Year) design and implementation project that satisfies the AAU senior project requirement and ABET engineering design requirement.
Internship **0102493**	This course provides real world experience in Cybersecurity field. The internship must be off-campus and students must complete at least one semester of work consisting of 240 hours or 20 hour work per week

Big Data from Social Networks 0103415	The amount of data from questionnaires and social networks has grown enormously. Computer tools are needed to understand what these data are telling us. Students will gain valuable experience in questionnaire analysis, and in the use of software for understanding and reporting the underlying messages from data sources such as social networks. They will also meet appropriate high performance computing techniques.
Secure Systems Architectures and Mechanisms 0103414	System security addresses protection mechanisms appropriate to various IT systems and architectures, focusing upon technologies that are appropriate regardless of whether a system is implemented as part of a network. These mechanisms and cryptographic protocols help to provide confidentiality, integrity of data as well as authentication and authorization.
Intrusion Analysis and Incident Management 0102412	This module will examine the field of intrusion prevention, detection and response and the role it plays within modern information security systems. It will introduce key concepts in the analysis of network traffic for signs of intrusions, as well as the process of responding to computer incidents.
Information Security Management and Governance 0102414	This module looks at the issues surrounding the management and governance of information security within an organizational context. Consideration is given to the need for related policy, analysis of risk, and the management of organizational assets. Coverage also includes legal and personnel aspects of security, giving an overview of the wide range of laws and regulations governing systems & information security.
Cyber Competition 0103419	This course provides preparatory techniques for the participation in cyber competitions. Topics include network monitoring using Wireshark, port scanning using Nmap, encryption and tunneling techniques, cyber-attacks, cyber defense mechanisms, penetration and exploit tools, defenses against Malware, computer forensics and steganography. Team cooperation is necessary to perform and strengthen learned skills.
Cyber Warfare 0103418	This course provides an overview of the rapidly changing face of cyber warfare and the potential impact caused from using it by military and terrorist. Topics covered in this course include: cyber threatscape, cyber battlefield, cyber doctrine and cyber warriors. The course will also cover logical, physical and psychological weapons related to cyber warfare. Student will explore the fundamentals of computer networks attacks and defense mechanisms, the foreign actors in computer networks operations, the impacts of cyber warfare on the legal systems, cyberspace challenges and the future of cyber warfare.