



وزارة التعليم

Ministry of Education



جامعة المستقبل

Mustaqbal University

أول جامعة أهلية بمنطقة القصيم

كلية الهندسة وعلوم الحاسب

قسم هندسة الحاسب

توصيف مقررات

برنامج هندسة الشبكات

العام الجامعي 1443 هـ

📁 MATH 102 Calculus II

Credits and contact hours: 4 (4,1,0)

Definite and indefinite integrals of functions of a single variable. Fundamental Theorem of Calculus. Techniques of integration. Hyperbolic functions. Applications of the definite integral to area, volume, arc length and surface of revolution. Improper integrals. Sequences and series: convergence tests, integral, comparison, ratio and root tests. Alternating series. Absolute and conditional convergence. Power series. Taylor and Maclaurin series.

Prerequisite: MATH 101

📁 CHEM 101 General Chemistry I

Credits and contact hours: 4 (3,0,3)

Matter, atomic structure and the periodic table, chemical bonding, stoichiometry of pure substances, reaction in aqueous solutions, states of matter (gases, liquids, and solids), mixtures (with emphasis on some physical aspects of solutions), and thermochemistry. Laboratory: Qualitative and quantitative aspects of general chemistry.

Prerequisite: None

📁 ENGL 101 Introduction to Academic Discourse

Credits and contact hours: 3 (3,0,0)

This course is designed to enable students to recognize and interpret the various modes of spoken and written academic discourse and to produce written documents related to what they have read. The main writing skills component of the course teaches students to make use of the principal modes of exposition and various types of academic correspondence common in English to write well-organized texts. The course's reading skills element focuses on ways to improve students' reading of scientifically-oriented college-level text books and specialist articles and to familiarize them with the organizational and typographical features (glossaries, indices, headings, boldface, italics, etc.) of such texts. The course's oral skills element introduces students to academic oral communication in classroom and tutorial interaction. The electronic skills taught are intended to complement the written and oral skills by enabling students to use state-of-the-art internet and database search techniques to locate the information they require for expository composition writing and class-related tasks. Students will also be required to maintain a portfolio (including a reflective journal) exhibiting their efforts, progress, and achievement throughout the course.

Prerequisite: ENGL 002

📁 PHYS 102 General Physics II

Credits and contact hours: 4 (3,1,3)

A continuation of PHYS 101. Topics covered include: wave motion and sound; temperature, first and second law of thermodynamics; kinetic theory of gases; Coulomb's law; the electric field; Gauss' law; electric potential; capacitors and dielectrics; D.C. circuits; the magnetic field; Ampere's and Faraday's laws.

Prerequisite: PHYS 101, Co-requisite: MATH 102

IAS 201 Writing for Professional Needs

Credits and contact hours: 2 (2,0,0)

Characteristics and types of formal writing: reports; scientific research; summaries; forms resume; evaluations and minutes of meetings.

Prerequisite: IAS 101

📁 MATH 201 Calculus III

Credits and contact hours: 3 (3,1,0)

Polar coordinates, polar curves, area in polar coordinates. Vectors, lines, planes and surfaces. Cylindrical and spherical coordinates. Functions of two and three variables, limits and continuity. Partial derivatives, directional derivatives. Extrema of functions of two variables. Double integrals, double integrals in polar coordinates. Triple integrals, triple integrals in cylindrical and spherical coordinates.

Prerequisite: MATH 102

STAT 219 Probability and Statistics for Engineers and Scientists

Credits and contact hours:3 (2,0,3)

Presentation and interpretation of data, elementary probability concepts, random variables and probability distributions, binomial, Poisson, exponential, Weibull, normal and lognormal random variables. Estimation, tests of hypotheses for the one sample problem. Simple and multiple linear regression, application to engineering problems. The lab session will be devoted to problem solving using statistics software.

Prerequisite: MATH 102

ENGL 102 Introduction to Report Writing

Credits and contact hours: 3 (3,0,0)

This course sets out to develop students' spoken and written communication skills in English, particularly with regard to the production of a researched academic/professional type report. The writing skills component includes paraphrasing and synthesis of ideas from several different sources for expository composition and term report writing; training in composing various types of formal correspondence to enable students to function well in the university setting; the researching (library and internet), organizing, and writing of an academic term report in which students must be especially sensitive to their particular audience, introducing them to oral presentations in which they must communicate information to an audience using a variety of presentational media. Electronic skills are taught to complement the written and oral skills by enabling students to use state-of-the-art internet and database search techniques to locate the information they require in order to produce written reports or presentations. Students will also be required to maintain a portfolio (including a reflective journal) exhibiting their efforts, progress, and achievement throughout the course.

Prerequisite: ENGL 101

CS101 Computer Programming I

Credits and contact hours: 4 (3,0,3)

Overview of computers and computing. Introduction to a typical programming language, such as Java. Basic data types and operators. Basic object-oriented concepts. Wrapper classes. Console input/output. Logical expressions and control structures. Memory models and methods. Arrays and strings. More object-oriented concepts.

Suggested Lab work (Closed Lab): Programming assignments to exercise the use of the various features of the object-oriented programming language taught in the course. This may include the implementation of basic applets, numerical algorithms such as finding the average, standard deviation etc., as well as non-numerical algorithms such as basic recursive methods used in sorting and searching techniques.

Co requisite: MATH 101

IE 199 Introduction to Engineering and Design

Credits and contact hours: 3 (2,1,3)

Engineering profession, jobs, and disciplines; Elements of engineering analysis; Introduction to engineering design and team formation; Engineering problem definition; Engineering system Architecture and physical function decomposition; human factor, environment, and safety issues in design; Generation of alternative concepts; Evaluation of alternatives and selection of a concept, Design defense, performance evaluation, and reporting; Intellectual Property – Legal Factors, Engineering Ethics.

Prerequisite: None

IAS 212 Professional Ethics

Credits and contact hours: 2 (2,0,0)

Importance of ethics in Islam and the integration of worship and aspects of professional life. Suitability criteria for employment in Islam. Standards for professional behavior. Employee interaction with others. Application of Islam to professional violations. Saudi Laws and professional behavior.

Prerequisite: IAS 111

📁 MATH 260 Linear Algebra and Differential Equations Credits and contact hours:3 (3,1,0)

Systems of linear equations. Rank of matrices. Eigenvalues and eigenvectors. Vector spaces, subspaces, bases, dimensions. Invertible matrices. Similar matrices. Diagonalizable matrices. Block diagonal and Jordan forms. First order differential equations: separable and exact. The homogeneous differential equations with constant coefficients. Wronskian. Non-homogeneous differential equations. Methods of undetermined coefficients and variation of parameters. Systems of differential equations. Non-homogeneous systems.

Prerequisite: MATH 102

📁 COE 202 Digital Logic Design Credits and contact hours:3 (3,0,0)

Introduction to information representation and number systems. Boolean algebra and switching theory. Manipulation and minimization of completely and incompletely specified Boolean functions. Physical properties of gates: fan-in, fan-out, propagation delay, timing diagrams, and tri-state drivers. Introduction to hardware description languages (HDLs). VHDL. System modeling using VHDL. Combinational circuit analysis and design, multiplexers, decoders, comparators, and adders. Sequential circuit analysis and design, basic flip-flops, clocking and timing diagrams. Registers, counters, RAMs, ROMs, PLAs, PLDs, and FPGAs.

Prerequisite: PHYS 102

Co-requisites: COE 203

📁 COE 203 Digital Logic Design Lab Credits and contact hours:1 (0,0,1)

Review of Digital Logic Design: Design of Combinational Circuits, and Design of Sequential Circuits. Logic implementation using discrete logic components (TTL, CMOS), and programmable logic devices. Introduction to Field Programmable Logic Arrays (FPGAs). The basic design flow: design capture (schematic capture, HDL design entry, design verification and test, implementation (including some of its practical aspects), and debugging. Design of data path and control unit.

Prerequisite: PHYS 102

Co-requisites: COE 202

📁 CS102 Computer Programming II Credits and contact hours:4 (3,1,3)

This course continues the coverage of the fundamental concepts of Object-Oriented Programming started in Programming I (CS 101). It covers more advanced concepts and topics such as relationships between classes, inheritance, polymorphism, abstract classes, error handling, interfaces, generics and data structures.

Prerequisite: CS-101

📁 CS285 Discrete Math for Computer

Credits and contact hours: 3 (3,1,0)

Topics cover in this course include The Foundations: Logic and Proof, Sets, and Functions, Logic, Propositional Equivalences, Predicates and Quantifiers, Nested Quantifiers, Methods of Proof, Sets, Set Operations, and Functions. The Fundamentals: Algorithms, the Integers, and Matrices, Algorithms, Growth of Functions, Complexity of Algorithms, Integers and Division, Applications of Number Theory, Matrices. Mathematical Reasoning, Induction, and Recursion: Proof Strategy, Sequences and Summations, Mathematical Induction, Recursive Definitions and Structural Induction, Program Correctness. Counting: The Basics of Counting, Pigeonhole Principle, Permutations and Combinations, Binomial Coefficients Inclusion-Exclusion, Applications of Inclusion-Exclusion. Discrete Probability. Relations: Relations and Their Properties, Binary Relations and Their Applications, Representing Relations, Equivalence Relations. Graphs: Introduction to Graphs, Graph Terminology, Representing Graphs and Graph Isomorphism, Connectivity. Trees: Introduction to Trees, Applications of Trees, Tree Traversal, Spanning Trees. Boolean algebra: Boolean Functions, Representing Boolean Functions, Logic Gates. Modeling Computation: Languages and Grammars. The lab session to problem solving using software

Prerequisites: MATH 102

📁 EE 202 - Electric Circuits I

Credits and contact hours 3 (3,1,0)

Circuit theorems: Superposition principle, Thevenin and Norton theorems, Maximum power transfer theorem. Techniques of circuit analysis: Nodal and mesh analysis, Sinusoidal sources and the concept of phasors in circuit analysis. Introduction to the concept of average, reactive and complex power, and power factor. Introduction to three phase circuits.

Prerequisite: Math 102, Phys 102

📁 COE 204 Computer Organization

Credits and contact hours: 3 (3,0,0)

Introduction to computer organization, machine instructions, addressing modes, assembly language programming, integer and floating-point arithmetic, CPU performance and metrics, non-pipelined and pipelined processor design, datapath and control unit, pipeline hazards, memory system and cache memory.

Prerequisite: COE 202

📁 COE 205 Computer Organization Lab

Credits and contact hours: 1 (0,0,3)

MIPS Assembly Programming: Integer Arithmetic and Logic instructions, Flow Control instructions, Arrays and Files, Integer Multiplication and Division, MIPS Functions and the Stack Segment, Exceptions and I/O, Floating-Point representation. Modeling and designing using Logisim (Logic Simulator): Data Path Main Components Design (ALU design), Single-Cycle CPU Design, Pipelined CPU Design.

Prerequisite: COE 202

📁 CS-210: Data Structures and Algorithms

Credits and contact hours: 3 (3,1,0)

Fundamental concepts of data structures. Performance measurement of algorithms. Implementation and use of lists, stacks, queues, priority queues, trees, heaps, hash tables and graphs. Recursion. Students will do programming assignments.

Prerequisite: CS-102

EE 206 - Electric Laboratory I

Credits and contact hours: 1 (0,0,3)

General introduction to the laboratory. Ohms law, Voltage, current, and power in DC circuits using Kirchoff's laws. Superposition, Thevenin's, and Maximum power transfer theorems in DC circuits; Series and parallel AC circuits; Resonance in series and parallel circuit; The Oscilloscope and Function Generator, Sinusoidal AC Analysis Maximum power transfer theorem, Magnetically-coupled circuits; Electric Field and Potential Inside Capacitors. Capacitance and Inductance of Transmission Lines.

📁 Co-requisite: EE 202

EE 220- Electronics I

Credits and contact hours: 3 (3,1,0)

Introduction to semiconductor material properties; Semiconductor diodes: structure, Operation and circuit applications; Special diodes: Zener, LED, Solar cell and photodiode; Metal Oxide Field Effect Transistors (MOSFETs): Structure, operation, and Circuit applications; Bipolar Junction Transistor (BJT): Structure operation, and circuit applications. Thyristors: Structure and I-V characteristics.

Prerequisite: Phys 102

EE 270 - Signal and System Analysis

Credits and contact hours: 3 (3,1,0)

Motivation and applications, Signal classifications, Signal operations, Singularity functions; Linear time-invariant systems and convolution; Correlation; Fourier series and transform for continuous and discrete time signals; Frequency response; Laplace transform and applications.

Prerequisite: EE 202

📁 ENGL 214 Academic & Professional Communication

Credits and contact hours: 3 (3,0,0)

The purpose of this course is to further develop students' spoken and written communication skills in English in order to prepare them for future academic and professional life. The writing skills component includes training in composing various types of business correspondence to enable students to function well in the world of work. It also deals with the researching, organizing, and writing of technical reports in which students must be especially sensitive to their particular audience. The course's oral skills component enhances students' oral presentation skills as they will practice communicating a technical subject to a lay audience using a variety of presentational media. The electronic skills taught are intended to complement the written and oral skills by enabling students to use state-of-the-art internet and database search techniques to locate the information they require in order to produce written reports or presentations. Students will also be required to maintain a portfolio (including a reflective journal) exhibiting their efforts, progress, and achievement throughout the course.

Prerequisite: ENGL 102

📁 COE 304 - Introduction to Embedded Systems

Credits and contact hours: 4 (3,0,3)

Introduction to Embedded Systems. Microcontroller Hardware. ARM Processor. CPU Programming. Memory and I/O. Interfacing: Parallel and Serial Communication. A/D and D/A conversion Embedded system design methodologies. Specifications. Designing robust software for embedded systems. RTOS features.

Prerequisite: COE 204, CS 102

📁 COE 342 - Data & Computer Communication

Credits and contact hours: 4 (3,0,3)

Introduction to communication systems; Network architecture and the OSI reference model; Data transmission principles: time and frequency representation of signals, channel bandwidth, data rate, transmission impairments, channel capacity, Transmission media; Data encoding and modulation techniques; Digital data communication techniques; framing and synchronization, error detection, error correction; Data Link Control protocols: Flow control, Error control and ARQ, Multiplexing techniques; Example Data Link protocols.

Prerequisite: COE 204, EE 270

📁 CS225 - Software Engineering Design and Development

Credits and contact hours: 3 (3,1,0)

This is a general course, presenting the basic principles and concepts of software engineering and giving foundation for many other courses. It gives broad coverage of the most important terminology and concepts in the software engineering: basic understanding of software life cycle, software processes, requirements engineering processes, introduction to agile and extreme programming, basic modeling and design, basics of project management, software cost estimation, configuration management, and testing, introduction to ethics and professional practice in software engineering.

Prerequisite: CS 102

EE 221 – Electronics Laboratory I

Credits and contact hours: 1 (0,0,3)

Introduction to the lab tools, I-V characteristics of diode, clipping circuits using diodes, rectification using diodes, Zener diode and regulators, BJT DC biasing, CE BJT amplifier. MOSFET DC biasing, CS MOSFET amplifier, Simulation of Simple Circuits.

Co-requisite: EE 220

📁 EE 370 - Digital Signal Processing

Credits and contact hours: 3 (3,1,0)

Characterization and classification of discrete-time (DT) signals and systems; Typical DT signal processing operations; Linear time-invariant (LTI) - DT systems; Linear constant-coefficient difference equations; Frequency-domain representation of discrete-time signals and systems; Discrete Fourier Transform (DFT); Fast Fourier transform (FFT); Z-transform; Linear phase transfer functions; Digital filter structures; Finite-Impulse Response (FIR) Digital Filter Design; Infinite-Impulse Response (IIR) Digital filter design; Digital processing of continuous-time signals; Fundamentals of multirate digital signal processing; Applications.

Prerequisite: EE 270

📁 IAS 311 Islamic Shariah

Credits and contact hours: 2 (2,0,0)

This course is important for the student to act well in life. The course includes: (i) Good manners in life of Muslims in general; (ii) The state of Arabs before Islam in terms of marriage, divorce, and inheritance; (iii) The merits and characteristics of Islamic Sharia; (iv) A short study of the four Islamic jurisprudence schools, and (v) A short study of Islamic jurisprudence branches.

Prerequisite: IAS 111

📁 COE 344 Computer Networks

Credits and contact hours: 4 (3,0,3)

Introduction to computer networks: Internet architectures, Circuit-switching and Packet switching, Delay and loss, Protocol architectures and reference models; Application layer: Design issues, Client-server vs. peer-to-peer, main Internet protocols (HTTP, FTP, Email, DNS and P2P), Network Sockets; Transport layer: Multiplexing/Demultiplexing applications, UDP, Reliable data transfer, TCP, Congestion control mechanisms. Network layer: Virtual circuits vs. Datagram networks, routing, IP addressing and forwarding, Routing algorithms, Routing in the Internet; Link layer: Multiple Access protocols, Switched LANs, Link-layer addressing and ARP, Link-layer switches; Wireless LANs: 802.11 architecture, 802.11 MAC protocols.

Prerequisite: COE 342

📁 COE 308 Computer Architecture

Credits and contact hours: 3 (3,0,0)

Fundamentals of computer design, power, cost, performance, instruction set principles, instruction and arithmetic pipelines, dynamic and speculative execution, precise exception, memory hierarchy, multilevel caches, virtual memory, multicores, multiprocessors, new trends in computer architecture.

Prerequisite: COE 204

📁 CS311 Design and Analysis of Algorithms

Credits and contact hours: 3 (3,1,0)

The course aims at answering two questions: what can be computed by a machine? And how efficiently? It starts by presenting machines models, then addresses the computability problem, and then the complexity of algorithms and their classification according to it.

Prerequisite: CS 102

📁 CS330 Operating Systems

Credits and contact hours: 4 (3,1,3)

The course explores the evolution, services, and structures of operating systems. It covers the basic concepts of operating system design and implementation and management of system resources such as Central Processing Unit (CPU), Input/output (I/O) devices, memory, and software. Examples given from modern operating systems such as Unix and Windows-driven operating systems are scrutinized. The course features

practical hands-on exercises in implementation and testing of small multi-programmed operating systems.
Prerequisite: CS 210

IE 332 Engineering Economy

Credits and contact hours: 3 (3,1,0)

Cost concepts; Time value of money operations; Measuring the worth of investments; Comparison of alternatives; Depreciation; Economic analysis of public projects; Inflation, Breakeven analysis; Manufacturing costing.

Prerequisite: MATH 102

COE 444 Internetwork Design & Management

Credits and contact hours: 3 (3,0,0)

Principles of internetworking. Internetworking hardware. Bridging and switching technologies. Virtual LANs. Routing strategies. The network development life cycle. Network analysis and design methodology. Enterprise network design model. Backbone design concepts. Network security design. Structured cabling systems. Network design algorithms. Traffic flow analysis. Network reliability. Network management (SNMP). Network administration. Case studies.

Prerequisite: COE 344

COE 446 Computer & Network Security

Credits and contact hours: 3 (3,0,0)

Introduction to computer security: concepts, threats, type of attacks; Cryptography: Block ciphers, Public-Key, Cryptographic Protocols and standards. Integrity verification mechanisms, Authentication: Hash functions, User authentication Protocols, Wireless network security and associated protocols. Software tools to apply security in user environments. Access Control models and mechanisms. Database security, Intrusion detection systems, Firewalls. Malicious software, DoS attacks, Trusted computing and multilevel security.

Prerequisite: COE 344

COE 448 Wireless & Mobile Networks

Credits and contact hours: 3 (3,0,0)

Introduction to Wireless and Mobile Networks: Fundamental concepts in mobile wireless networks, Characteristics of wireless links, RF propagation, path loss models; Fixed assignment Multiple access techniques: FDMA/TDMA/CDMA, Performance of Fixed assignment techniques, Erlang-B model; The cellular concept: frequency reuse, cell architecture and handoff protocols; Cellular Technologies: 2G/GSM, 3G/UMTS/HSPA, 4G/LTE/LTE-A; Wireless LANs: multiple access techniques for LANs, IEEE 802.11 (WiFi); Mobility management: Mobile IP protocol.

Prerequisite: COE 344

COE 498 Design Project-I

Credits and contact hours: 3 (3,0,0)

The student should take a B.Sc. project in related area to his specialization and with technical merit. This project is for two semesters, it is counted as three credits for the first semester. At the end of the semester the student submits a report describing his projects and the parts he completed in the first semester and proposed parts in the 2nd semester. The projects are oriented toward providing experience in the establishment of objectives, criteria, synthesis, analysis, construction, testing, and evaluation; solution of open-ended problems; design methodology.

Prerequisite: EE 220

IE 412 Project Management**Credits and contact hours:** 3 (3,1,0)

The course covers the project management process from the beginning to the end, focusing on practical skills that make students able to immediately complete projects on time and on budget, while achieving their targets; Project Participants and Project Life Cycle. Contractual and organizational approaches; Projects Planning Processes and Bar Chart; Network Model; Scheduling using activity-on-node, precedence methods and time Scaled.; Resource levelling and allocation; Project time-cost trade-off; Financial Management: Cash flow Forecasting; Project time and cost control; Analysis of Scheduling Delay; Project risk analysis.

Prerequisite: MATH 201**COE 499 Design Project-II****Credits and contact hours:** 3 (3,0,0)

The student should take a B.Sc. project in related area to his specialization and with technical merit. This project is for two semesters, it is counted as three credits for the first semester. At the end of the semester the student submits a report describing his projects and the parts he completed during the semester. The projects are oriented toward providing experience in the establishment of objectives, criteria, synthesis, analysis, construction, testing, and evaluation; solution of open-ended problems; design methodology.

Prerequisite: COE 498**COE 4xx Computer Networks Elective I****Credits and contact hours:** 3 (3,0,0)

Computer Networks Elective Course

COE 4xx Computer Networks Elective II**Credits and contact hours:** 3 (3,0,0)

Computer Networks Elective Course

EE/CS/COE xxx: Technical Elective**Credits and contact hours:** 3 (3,0,0)

Technical Elective Course (For the Networks track)

IAS 4xx IAS Elective**Credits and contact hours:** 2 (2,0,0)

Islamic Elective Course