Remarks:

-In the university, for each academic semester, 16 hours is allocated for each theoretical credit, 32 hours for each practical credit and 48 hours for each workshop credit

Title of the Course: General Math. I

Number of Credits: 4
Type of the Course: Theoretical
Pre-requisite: None
Course Objectives:
Basic concepts of Calculus and Geometry will be taught to the students in this course which provides necessary background for technical courses.
Course Syllabus:
Cartesian coordinates; polar coordinates; complex numbers; addition, product, root & geometrical representation of complex numbers; polar representation of complex numbers; function; functions algebra; limit and relevant theorems; infinite limit and limit in infinite; left-hand and right-hand limit; connectivity; derivative; derivation formula; inverse function and its derivative; trigonometric functions derivative and their inverse functions; Rolle's theorem; mean theorem; Taylor expansion; geometrical and physical applications of derivative; curves and acceleration in polar coordinates; application of derivative in approximation of equations roots; definition of integral of continuous functions and piecewise continuous; basic theorems of differential & integral arithmetic; primitive function; approximate methods of integral estimate; application of integral in computation of area, volume, length of curve, moment, center of gravity and labor ….(in Cartesian and polar coordinates); logarithm and exponential function and their derivative; hyperbolic functions; integration methods such as change of variable, component and decomposition of fractions; transform of special variables of sequence and numerical series and relevant theorems; power series and Taylor theorem with remainder.
Textbook: R.L. Finney, G.B. Thomas, Calculus and Analytic Geometry, Geometry, 9th Edition, Addison Wesley, 1996

Title of the Course: General Math. II

Number of Credits: 4
Type of the Course: Theoretical
Pre-requisite: General Math. I
Course Objectives:
Basic concepts of Calculus and Geometry will be taught to the students in this course which provides necessary background for technical courses, continuing "General Math. I "discussions.
Course Syllabus:
Parametric equations; space coordinates; vector and space; numerical product; matrix 3x3 of three-indeterminate linear equations system; operation on lines; matrix reverse; solving equations system; linear independence; base in R^2; R^3 linear transform and its matrix; determinate 3x3 and characteristic value and vector; vector product; second order line and plane equations; two vector functions and its derivative; speed and acceleration; bending; normal vector to a curve; multivariable function; directional and partial derivative; tangent plane and normal line to a curve; multivariable function; directional and partial derivative; tangent plane and projecting line of gradient; chain of rule for partial derivative; exact differential; second kind and third kind integrals and their application in geometrical and physical problems; transform of integration arrangement (without accurate affirmation); cylindrical and spherical coordinates; vector field; curvilinear integral; surface integral; divergence; curl; Laplacian; potential of green space and divergence and stochastic.
Textbook: R.L. Finney, G.B. Thomas, Calculus and Analytic Geometry, Geometry, 9thEdition, Addison Wesley, 1996

Title of the Course: Differential Equations

Number of Credits: 3
Type of the Course: Theoretical
Pre-requisite: General Math. I
Course Objectives:
In this course, first and second levels of linear differential equations and some nonlinear differential equations will be introduced, in addition, students will learn about some numerical and analytical ways to solve Mathematical Problems.

Course Syllabus:
Nature of differential equations and their solution, family of graphs and vertical routes, physical patterns, separable equation, first order linear differential equation, homogeneous equation, 2nd order linear equation, homogenous equation with fixed constants, method of indefinite constants, method of changing parameters, application of 2nd order equations in physics and mechanics, solution of differential equation with series, Bessel and Gamma functions, Legendre polynomial, an introduction to differential equations set, Laplace transform and its application in solving differential equations
Textbooks:
1. E. Kreyszig, Advanced Engineering Mathematics, 1999
2. P. Blanchard, R.L. Devaney, and Co. Hall, Differential Equations, 1st Edition, Brooks/Cole Pub, 1998

Title of the Course: Fundamentals of Statistics and Probabilities
Number of Credits: 3
Type of the Course: Theoretical
Pre-requisite: General Math. I
Course Objectives:
By learning this course, students will be able to use basic rules of Probability Theory for real modeling of information problems
Course Syllabus:
An introduction to theory of sets, samples and their table display together with average, exponent, middle and variance of conversion and composition, probabilities and the relevant theorems, random variables, intermediate and average and variance of distributions, Poison's two-phrase distributions, geometric difference, normal distribution, distribution of several random variable, random sampling and random numbers, sampling from small society, estimation of statistical parameters, assurance intervals, test 2 presumptive test of decision-making, analysis and variance, regression, correlation, nonparametric methods test, fitting straight line on data.
Textbooks:
1. WalpoleandMyers, Probability and Statistics for Engineering and Scientists, 6th Edition, Prentice Hall. 1998
2. R.V. Hogg and T. Elliott, Probability and Statistical Inference, 4th Edition, Macmillan, 1993

Title of the Course: Discrete Math.
Number of Credits: 3
Type of the Course: Theoretical
Pre-requisite: None
Course Objectives: Nowadays, many Information Processing Systems are related to Discrete Mathematics, and so this course will try to teach students the concepts of this field.
Course Syllabus:
Introduction: mathematical logic, algebra of expressions, well-structured formula, a review of theory of sets, proving methods. Relations and functions: dual relations, compatibility and equivalence relations, relations representation matrix, relations graph, functions, subjective functions, one to one functions.
Graph theory: directed graphs, undirected graphs, Eulerian path and Hamiltonian path, optimal paths, algorithm finding of optimal paths, connected graphs, matrix of relation and related theorems.
Trees: minimal subjective trees, menstruation of tree, application of trees, algebraic expressions and representation of their trees, application of graphs in activities analysis and projects control, Combinational analysis: pigeon hole principle, an introduction to combinational algorithms, recursive functions and their application.
Algebraic structures: semi-groups and monodies, grammars and languages, Polish marking, groups, homomorphism, isomorphism, lattices, Boolean Algebra, grammar as an example of monodies, machines with finite states, their algebraic and graphic representation, Turing machine, Markov's algorithm, an introduction to theory of computability.
Textbooks:
1. R. Johnsonbaugh, Discrete Mathematics, Macmillan Pub. Company, 1997
2. K. H. Rosen, Discrete Mathematics and Its Applications, 4th Edition, Mc Graw Hill, 1999

Title of the Course: Fundamentals of Mathematical Sciences
Number of Credits: 3
Type of the Course: Theoretical
Pre-requisite: General Math. I
Objective: This course introduces the basic concepts, ideas and tools involved in doing mathematics. As such, its main focus is on presenting informal logic, and the methods of mathematical proof. These subjects are closely related to the application of mathematics in many areas, particularly computer science. Topics discussed include a basic introduction to elementary number theory, induction, the algebra of sets, relations, equivalence relations, congruence, partitions, and functions, including injections, surjections, and bijections. A basic introduction to the real numbers, rational and irrational numbers. Supremum and infimum of a set.
Textbook: Fundamentals of Mathematics, by James Van Dyke, James Rogers, Holli Adams 10th Edition.

Title of the Course: Fundamentals of Computer & Programming
Number of Credits: 3
Type of the Course: Theoretical
Pre-requisite: None
Course Objectives:
This course will teach students the main concepts of Programming using a Programming Language such as C++. Techniques of Developing and Implementing Algorithms in a programming language will be taught in this course.
Course Syllabus:
Introducing organization and main parts of computer, machine language and assembly, numeric and non-numeric data representation, algorithms and sub-algorithms and flowchart, basic concepts such as frequency, selection, repetition and branching, familiarity with a structured language and programming including: constants and variables, computational and logical phrases, different types of instructions, different types of conditional operations loops, vectors and matrices, subprograms, input and output instructions, common algorithms such as methods of search and arrangement, practical examples of programming in C++ Programming.
Textbooks:
1. T.C. Bartee, Digital Computer Fundamentals, McGraw Hill, 1981
2. J.G. Brookshear, Computer Science, and Overview, 6th Edition, Addison Wesley, 1999

Title of the Course: Data Structures and algorithms
Number of Credits: 4
Type of the Course: Theoretical
Pre-requisite: Advanced Computer Programming
Course Objectives:
Familiarity with Information Structures, Effects of Structures in Produced Applications, Selecting Optimized Inside-Memory Structures, Organizing Memory based on requirements.
Course Syllabus:
Arrays, vectors, matrices, private matrices, arrays display, stacks, queues and rows, bond lists: graphic, cyclical, double bond, multi-bond, method of display and application of bond lists, trees and their menstruation, method of representation and application of trees: decision making trees, search trees, tree of the game and etc, graphs and their representation, dynamic memory allocation and the relevant issues, searching and sorting and combining algorithms
Textbooks:
1. A.V. Aho, J.E. Hopcroft, J.D. Ullman, Data Structures and Algorithms, Addison Wesley, 1983
2. D.E. Knuth, The Art Of Computer Programming, Volume I: Fundamental Algorithms, 3rd Edition, Addison Wesley, 1997

Title of the Course: Numerical Linear algebra
Number of Credits: 3
Type of the Course: Theoretical
Pre-requisite: Fundamentals of Numerical Analysis
Objective: The course discuses Numerical linear algebra (NLA) with emphasis on applications in engineered systems; matrix factorizations; perturbation and rounding error analyses of fundamental NLA algorithms. Offered in alternate years.
To give students an in-depth introduction to the graduate-level numerical linear algebra (NLA) that lies at the heart of all modern computational science and engineering. Throughout the course there is an emphasis on the interplay between the underlying mathematical descriptions of algorithms and their implementation on specific computing machines with specific software. Students should gain from the course an ability to be an intelligent, discriminating user of current algorithms and software in NLA and related disciplines.

Textbook: Hager,W., Applied Numerical Linear Algebra, Prentice Hall 1988.

Title of the Course: Principles of Combinatorics
Number of Credits: 3
Type of the Course: Theoretical
Pre-requisite: General Math. I

Objective: A basic introduction to combinatorics and graph theory for advanced students in computer science, mathematics, and related fields. Topics include elements of graph theory, Euler and Hamiltonian circuits, graph coloring, matching, basic counting methods; generating functions; recurrences; inclusion-exclusion; Polya's theory of counting, combinatorial game theory.

Textbook: Alan Tucker, *Applied Combinatorics*, 6th edition (2012)

Title of the Course: Fundamentals of Numerical Analysis
Number of Credits: 3
Type of the Course: Theoretical
Pre-requisite: General Math. II
Objective: The course will introduce basic numerical methods used for solving problems that arise in different scientific fields. Properties such as accuracy of methods, their stability and efficiency will be studied. Students will gain practical programming experience in implementing the methods using MATLAB or Scilab. We will cover the following topics (not necessarily in the order listed): Finite Precision Arithmetic and Error Propagation, Linear Systems of Equations, Root Finding, Interpolation, least squares, Numerical Integration.

Textbook: Numerical Analysis, Timothy Sauer

Title of the Course: Numerical Analysis
Number of Credits: 3
Type of the Course: Theoretical
Pre-requisite: Fundamentals of Numerical Analysis
Objective: This course will emphasize the development of numerical algorithms to provide solutions to common problems formulated in science and engineering. The primary objective of the course is to develop the basic understanding of the construction of numerical algorithms, and perhaps more importantly, the applicability and limits of their appropriate use. The emphasis of the course will be the thorough study of numerical algorithms to understand (i) the guaranteed accuracy that various methods provide, (2) the efficiency and scalability for large scale systems. And (3) issues of stability. Topics include the standard algorithms for numerical computation:

root finding for nonlinear equations, interpolation and approximation of functions by simpler computational building blocks (for example - polynomials and splines), numerical differentiation and divided differences ,numerical quadrature and integration, numerical solutions of ordinary differential equations and boundary value problems.

Textbook: Borden Richard L., Numerical Analysis 6th Ed.1997.

Title of the Course: Mathematical analysis

Number of Credits: 3

Type of the Course: Theoretical

Pre-requisite: General Math. II

Objective: Mathematical analysis is the branch of mathematics dealing with limits and related theories, such as differentiation, integration, measure, infinite series, and analytic functions. These theories are usually studied in the context of real and complex numbers and functions. Analysis evolved from calculus, which involves the elementary concepts and techniques of analysis. Analysis may be distinguished from geometry; however, it can be applied to any space of mathematical objects that has a definition of nearness (a topological space) or specific distances between objects (a metric space).

Textbook: Apostol, Tom M. 1974. Mathematical Analysis. 2nd ed. Addison–Wesley

Title of the Course: Basics of matrices and linear algebra

Number of Credits: 3

Type of the Course: Theoretical

Pre-requisite: Fundamentals of Mathematical Sciences

Objective: This course covers matrix theory and linear algebra, emphasizing topics useful in other disciplines. Linear algebra is a branch of mathematics that studies systems of linear equations and the properties of matrices. The concepts of linear algebra are extremely useful in physics, economics and social sciences, natural sciences, and engineering. Due to its broad range of applications, linear algebra is one of the most widely taught subjects in college-level mathematics (and increasingly in high school). After successfully completing the course students will have a good understanding of the following topics and their applications: Systems of linear equations, Row reduction and echelon forms, Matrix operations, including inverses, Block matrices, Linear dependence and independence, Subspaces and bases and dimensions, Orthogonal bases and orthogonal projections, Gram-Schmidt process, Linear models and least-squares problems, Determinants and their properties, Cramer's Rule, Eigenvalues and eigenvectors, Diagonalization of a matrix, Symmetric matrices, Positive definite matrices, Similar matrices, Linear transformations, Singular Value Decomposition.

Textbook: Linear Algebra, By Kenneth M Hoffman, And Ray Kunze

Title of the Course: Fundamentals of Logic

Number of Credits: 3

Type of the Course: Theoretical

Pre-requisite: Fundamentals of Mathematical Sciences

Objective: In this course we will study Description Logics (DL), an important powerful class of logic-based knowledge representation languages. The emphasis will be on a rigorous approach to knowledge representation and building ontologies. After an original review of the relevant concepts on computational logics, DL will be introduced with its simplest formalization; in the second part of the course, we will consider advanced topics such as the representation of knowledge bases and ontologies, and the connections of DL with Modal Logics and First Order Logic. The last module of the course will analyze the connections of DL with database theory.

Textbook: - Mordechai Ben-Ari. Mathematical Logic for Computer Science, 3th Edition.

- Mathematical Introduction to Logic, Second Edition by Herbert B. Enderton Hardcover

Title of the Course: Principles of Computer Systems

Number of Credits: 4
Type of the Course: Theoretical
Pre-requisite: Advanced Computer Programming
Course Objectives:
In this course, students will learn how Computers work and become familiar with their organization. Also they could gain some practical experiences in designing, utilizing and developing computer sections and joining them to Microprocessors.
Course Syllabus:
An introduction to computer configuration, introducing different generations of computer, register transfer and micro-operations, register transfer language, inter-register transfer, computational micro-operations, sliding micro-operations, control functions. Basic computer organization and its design, instruction codes, computer instructions, scheduling and controlling, designing a sample computer such as PDP/8 and its micro-operations, methods of numbers representation, representation by fixed point, representation by floating point, other binary codes, errors revealing codes, organization of central processor including systems with several processor registers and bass system and systems using stack, study of several computers such as PDP/11, IBM 370. Designing computational processors, comparison and subtraction of binary numbers without sign, algorithm of multiplication and division with fixed and floating point. Input and output organization, memory organization, auxiliary memories, memory of microcomputer, hierarchy of memory, associative memory, dummy memory, cache memory, memory management hardware.
Textbooks:
1. V.C. Hamacher, Z.G. Zaky, and Z.G. Vranesic, Computer Organization, Mcgraw-Hill, 1996
2. D.A. Peterson, N. Indurkhya, Computer Architecture, Hardware/Software Design, Morgan Kaufmann, 2nd Edition, 1997
3. PattersonD.A., Hennessy, Computer Organization and Design, the Hardware Interface, 2nd Edition, Morgan Kaufmann Pub., 1997

Title of the Course: Advanced Computer Programming
Number of Credits: 3
Type of the Course: Theoretical
Pre-requisite: Fundamentals of Computer & Programming
Course Objectives
Students will learn the advanced concepts and techniques such as OOP in Programming using C++ language.
Course Syllabus:
In depth C++ programming, Introduction of UI design QT. Complementary issues of C programming, Memory management, In depth understanding of C++ codes, Coding relation with operating system, file management, IO streams, clear implementing basic data structures like link lists, Generic programming, Implementation of inheritance and its related issues in C++, Operator overloading, Graphical interface design using QT. Multithreading essentials, exception handling, object oriented programming principles, comparing C++ with other languages, Debugging and testing of programs, Function calling conventions, Dynamic memory coding.
Textbook:
1. Pohl, Object Oriented Programming in C++, 2nd Edition, Addison Wesley, 1997
2. Structured Approach to Programming, J. Hughes

Title of the Course: Fundamentals of Theory of computation
Number of Credits: 3
Type of the Course: Theoretical
Pre-requisite: Fundamentals of Mathematical Sciences
Course Objectives:

Some subjects of this course are Finite Automata, Push down Automata, Turing Machine, Machine Grammars and Languages, and so on.
Course Syllabus:
Finite automata, PUSHDOWN automata, touring machine, different types of grammars and languages, Chomsky classification, relation between languages and machines and the relevant theorems.
Textbooks:
1. P.Linz, Introduction to Formal Languages and Automata, 2ndEdition, D.C. Heath Company, 1996
2. P. Revesz, Theory of Formal Languages, Mcgraw Hill, 1985
3. D.I.A Cohen, Introduction to Computer Theory, John Wiley & Sons, 1991

Title of the Course: Database Design
Number of Credits: 3
Type of the Course: Theoretical
Pre-requisite: Data Structure and algorithms
Course Objectives:
In this course, theoretical and practical concepts of Relational Databases are introduced, and Concurrency, Security, and Completeness aspects of Database Systems are discussed.
Course Syllabus:
Survey of change and evolution of data storage and retrieval technology, reminding storage and retrieval in non-bank policy, definition of database, data, existence, relation between existences, Operating medium, different types of communications, data engineering, data abstraction, Difference of bank policy with non-bank policy, bank medium components including application of data, software and hardware, database system architecture including: external, conceptual, internal and physical levels, database management system, method of achieving database in different levels, data models including relational, hierarchical and network models mentioning to the other models, detailed study of model, relational computations, study of a specified sample of relational model, normalization in relational model, safety, confidentiality, protection, non-defectiveness and comprehensiveness of database, very large database and special machines of database. The student should perform a theoretical project and a practical project in appropriate to the objective of design and implementation of a base.
Textbooks:
1. R.A. Elmasri, S.B. Navathe, Fundamentals of Database Systems, 3rdEdition, Addison Wesley, 1999
2. C.J. Date, An Introduction to Database Systems, 7th Edition, Addison Wesley, 1999
3. R. Ramakrishnan, Database Management Systems, Mcgraw-Hill, 1997

Title of the Course: Design and Analysis of Algorithms
Number of Credits: 3
Type of the Course: Theoretical
Pre-requisite: Fundamentals of Theory of computation, Principles of Combinatorics
Course Objectives:
IN this course students will learn to design Efficient and Optimized Algorithms for Computer Programs.
Course Syllabus:
Review of essential points of Data Structures, problem solving methods (for each methods some problems and special algorithm for the problem shall be represented and being analyzed), introducing to complexity, divide & conquer method (problems to be analyzed: max and min of an array, multiplication of two n-bit number, Strassen method about matrix multiplication, round robin algorithm, sorting with Quicksort algorithm), dynamic programming method (matrix multiplication, traveling sales man problem, polygon triangulation),greedy algorithms(scheduling problem, Huffman Code, making change),methods based one xhaustive search, alpha-beta pruning (puzzle, tic-tac-tac), revelation of methods for problems, graph algorithms(searching methods of graph, Dijkstra algorithms, minimum spanning tree, Floyd algorithm, topological sorting and…), maximum flow networks and other problems.
Textbooks:

1. R.E. Neapolitan and K.Naimipour, Foundations of Algorithms using C++ Pseudo Codes,2nd Edition, Johns and Bartlett Publishers, 1998
2. Leiserson, Rivest, Introduction to Algorithms, MIT Press, 1990
3. E. Horowitz, andS. Sahni, Foundations of Computer Algorithms, Computer Science Press, 1978
4. Aho, Hopcroft, and Ullman, Data Structures and Algorithms, Addison Wesley,
5. G. Brassard, and P. Bratley, Fundamentals of Algorithms, Prentice Hall, 1996

Title of the Course: Principles of Software Designing
Number of Credits: 3
Type of the Course: Theoretical
Pre-requisite: Data Structure and algorithms
Course Objectives:
Section one: Software Engineering introduction, Software Engineering principles in developing computer systems, software production(from requirements specification to implementation phase), system life-cycle models, software design approaches (performance oriented, data oriented, object oriented), software implementation strategies, documentation techniques, software testing and validation, software reliability and accuracy, software debugging and defense mechanisms, software optimization, reusability in software design, software development and maintenance, change mechanisms, software production environmental concerns Section two: Software Project: Practical or theoretical study in one of students' desirable Aspects in the field of computer software, which its result is documentation, design and Implementation of a software product. Attempt should be made that subject matter of study could remove a problem or a real and practical shortage in industries of the country or in the university.
Textbook: A. Sommerville, Software Engineering, Addison Wesley, 2000

Title of the Course: Computer Networks
Number of Credits: 3
Type of the Course: Theoretical
Pre-requisite: Principles of Computer Systems
Course Objectives:
Basics and Principles of Computer Networks and Data Transition Systems will be introduced in this course. Also practical principles of developing Local Networks will be presented.
Course Syllabus:
Structure of networks, network architectures, reference model of ISO, networks of ARPA, SNA, DECNET and general. Network topology, connectivity analysis, delay analysis, design of network with local access. Design of physical layer, fundamentals of theory for data transfer, transfer telephone systems and multiplexing, survey on terminal, transfer errors. Data relation layer, primary protocols for data relation, sliding window protocol, protocols analysis. Primary layer of network, point-point networks, routing algorithms, density. Secondary layer, satellite and radio networks, broadcasting satellite packages, radio packages.
Textbooks:
1. J.F. Kurose, Computer Networking, a Top Down Approach Featuring the Internet, Addison Wesley, 2001
2. A.S. Tanenbaum, Computer Networks, 3rd Edition, Prentice Hall, 2002
3. A. Leon Garcia, Communication Networks, Mcgraw-Hill, 2000

Title of the Course: Artificial Intelligence
Number of Credits: 3
Type of the Course: Theoretical
Pre-requisite: Data structures and algorithms, Fundamentals of statistics and probabilities
Course Objectives:
This course is related to Artificial Intelligence subjects in Computer Science such as Chess Game, Pattern Recognition, Speech Recognition, and Problem Solving.

Course Syllabus:
Introducing artificial intelligence, searching methods, basic methods for solving problems, Estimation methods, introducing the games, knowledge representation by use of first order logic, knowledge representation by use of the other orders logic, structured representation of knowledge, advanced systems for solving problems, heuristic functions, understanding natural language, the issue of understanding and learning, implementation of artificial intelligence systems including: languages and machines, study of practical application of artificial intelligence in the fields of medicine, science, architecture and industries, new research results, existing problems and an outlook to the future. In this course one of the languages for understanding artificial intelligence such as LISP and/or PROLOG should be used.
Textbook: S. Russell, P. Norvig, Artificial Intelligence: A Modern Approach, 1stEdition, Prentice Hall, 1994

Title of the Course: Economic fundamentals
Number of Credits: 3
Type of the Course: Theoretical
Pre-requisite: None
Course Objectives:
In this course students will learn about the Fundamentals of General Economy and the impact of Engineering Economy on Decision Making Processes.
Course Syllabus:
General economic fundamentals, engineering economy decision making process, fundamental Concepts containing economic interest, compounded interest rate. Economic design comparison with methods of present value, annual equivalent worth analysis, internal rate of return, benefit/cost ratio and etc. Replacement problem analysis, sensitivity analysis, inflation rate and etc.
Textbooks:
1. G.J. Thuesen, W.J. Fabrichy, Engineering Economy, (Prentice-Hall International Series in Industrial and Systems Engineering), Prentice Hall College Div; 9th Edition 2000

Title of the Course: General English Language
Number of Credits: 3
Type of the Course: Theoretical
Pre-requisite: None
Course Objectives: The aim of this course is that students learn about the General English language.

Title of the Course: English for special purpose (English Language for Computer science)
Number of Credits: 2
Type of the Course: Theoretical
Pre-requisite: General English Language

Course Syllabus:
This subject aims at raising students' specific language ability in reading and writing academic texts of their own major disciplines. The subject will use reading texts from chapters of books or journal articles recommended by teachers of different majors for reading comprehension. These texts will also be used for analysis to enable students to develop an awareness of the genre in that particular discipline.

Title of the Course: Computer Simulation
Number of Credits: 3
Type of the Course: Theoretical
Pre-requisite: Data Structure and algorithms, Fundamentals of Statistics and Probabilities
Course Objectives:

This course contains the complete Life Cycle of a Computer Simulation Project. In this course, students will be able to utilize their knowledge to solve a Real Engineering Problem.
Course Syllabus:
Definition of simulation; comparison of simulation with other methods; continuous, discrete and complex systems; modeling; models characteristics; continuous models simulation; discrete models simulation, programming languages special for simulation such as DESIRE, MATLAB,SLAM II and ACSL and full application and use of capabilities of one of them; conducting test on continuous models; verification and validation; simulation results; full familiarity with and application of a language special for simulation of discrete models(such as GPSS,SIMSCRIPT);statistical concepts in simulation, production of random numbers and variables; independency and uniformity tests; production of random variables with different distributions; execution of a practical project of simulation and analysis of the result of which.
Textbook: J Banks, B. Nelson, and J. Carson, Discrete-Event System Simulation, 2ndEdition, Prentice-Hall 1995

Title of the Course: Cryptography theory
Number of Credits: 3
Type of the Course: Theoretical
Pre-requisite: None
Objectives: Introduction to the theory and practice of cryptographic techniques used in computer security. Encryption (secret-key and public-key), message authentication, digital signatures, entity authentication, key distribution, and other cryptographic protocols. The social context of cryptography.

Textbook:

١- J. Pieprzyk, T. Hardjono and J. Seberry, “Fundamentals of Computer Security”, New York, NY: Springer, 2003.
٢- A. Menezes, P. Van Oorschot, S. Vanstone, “Handbook of Applied Cryptography”, CRC Press, 1997.
٣- W. Trappe, L. C. Washingotn, “Introduction to Cryptography with coding theory”, Pearson-Prentice Hall, 2006.
٤- D. Stinson, “Cryptography. Theory and Practice”, 2nd Edition, CRC Press, 2002.

Title of the Course: Data Mining
Number of Credits: 3
Type of the Course: Theoretical
Pre-requisite: Data structure and algorithms, Fundamentals of statistics and probabilities
Course Objectives:
This course introduces students to Data Fundamentals. In this course, students learn about Data Analysis and Data Mining Concepts. Further in this course students learn about the Concepts of Classification, Pattern Recognition, and etc.
Textbook:

١- G. Shmueli, N. R. Patel, and P. C. Brouce, “Data Mining for Business Intelligence”, John Wiley & Sons, 2007.
٢- M. Bramer, “Principles of Data Mining”, Springer, 2007.
٣- C. Vercellis, “Business Intelligence: Data Mining and Optimization for Decision Making”, John Wiley & Sons, 2009.
٤- P. N. Tan, M. Steinbach, V. Kumar, “Introduction To Data Mining”, Addison-Wesley, 1st Edition, 2005.
٥- J. Han, J. Pei, “Data Ming: Concepts and Techniques”, 2nd Ed., Morgan Kaufmann, 2006.
٦- Ian H. Witten and Eibe Frank, “Data Mining: Practical Machine Learning Tools and Techniques”, 2nd Edition, Morgan Kaufmann, 2005.

Title of the Course: Programming Languages
Number of Credits: 3
Type of the Course: Theoretical

Pre-requisite: Data structure and algorithms

Objective: The projects focus either on various aspects of programming languages (for example, simple parsers, translators, symbolic computation, and implementation of abstract data types) or on exercising the particular strengths of a given language. Students work individually or in small groups on several programming projects. Students design, implement, and test their solutions. Each project typically uses a different language, such as: Ada, C++, Java, Smalltalk, Python, LISP, Scheme, Standard ML, Haskell, and Prolog. At least one project language will support object-oriented programming and at least one will be a non-imperative language. Students will: (1) learn the fundamental principles of modern computer programming languages; (2) learn the commonalities and differences among the different languages; (3) learn about a variety of different programming languages and about their relative strengths and weaknesses; and (4) gain experience designing and writing programs in a selected set of languages.

Textbook:

K. Louden, Programming Languages: Principles and Practice, Thompson, 2nd edition, 2003.

Title of the Course: Computer Graphics

Number of Credits: 3

Type of the Course: Theoretical

Pre-requisite: Data structure and algorithms

Objective: Students will (1) learn the basic principles and problems of computer graphics; (2) learn mathematical background to understand and implement these basic principles; and (3) learn the underpinnings of the implementation of computer graphics modeling and rendering systems.

The course contains Principles of computer graphics, with a focus on interactive systems. Current graphics hardware, elementary operations in two-and three-dimensional space, geometric transformations, camera models and interaction, graphics system design, standard graphics APIs, individual projects.

Textbook:

Angel, Interactive Computer Graphics A Top Down Approach With Open GL, Addison- Wesley, 2005

Title of the Course: Principles of Operating Systems

Number of Credits: 4

Type of the Course: Theoretical

Pre-requisite: Data structure and algorithms

Course Objectives: Data structure and algorithms

This course is relates to the most of the Operating Systems' fundamental structures, their specification and usages.

Course Syllabus:

Definition, existence philosophy, basic functions, different types of operating systems, operating systems hierarchy, operating system in view of user, Program Status Word (PSW), concept of interrupts, different types of interrupts and their processing, interrupts priority and next coming,

I/O programming and the relevant facilities, concurrency in I/O, memory management, introducing multiprogramming environments, static memory allocation, dynamic memory allocation, commutative memory allocation, paging according to demand, partitioning, paging part, memory hierarchy.

Processor management, works scheduling, scheduling policies, processes scheduling, processes scheduling policies, multiprocessor systems, weak communication, stable communication, allocation of sources to processes, competition mode, blocked mode and methods of releasing, mutual exclusion, processes concurrency by use of semaphore and problems resulting from which. Systems management, basic functions, exclusive, common and dummy instruments, I/O

instruments and subsidiary memories, conversion of exclusive instruments to dummy instruments, extra linear processing, direct communication, auxiliary processor of spooling system.
Textbooks:
1. W. Stallings, Operating Systems, 4th Edition, Prentice Hall, 2001
2. A. Silberschatz, J.L. Peterson, Operating Systems Concepts, Addison Wesley, 2000 Course

Title of the Course: Compiler. I
Number of Credits: 3
Type of the Course: Theoretical
Pre-requisite: Fundamentals of Theory of computation
Objective: This course introduces the students to the principles of compiler writing. It focuses on lexical analysis, parsing, and simple code generation. The students are expected to write a complete compiler for a very simple high level programming language.

Textbook: A. Aho, M. Lam, R. Sethi, and J. Ullman, Compilers: Principles, Techniques, and Tools (2nd Edition), Prentice Hall, 2006. ISBN 0-321-48681-1.

Title of the Course: Mathematics Software
Number of Credits: 3
Type of the Course: Theoretical
Pre-requisite: Fundamentals of Numerical Analysis
Objective: This course provides an introduction to the use of several software packages, which are useful to mathematics students. Among the packages are Maple and Mathematica for symbolic computing, TeX and LaTeX for mathematical documents, and Matlab for numerical computing. The course will also introduce the mathematical facilities built into spreadsheets such as Excel. The aim of the course is to provide the student with some basic skills in the use of this software without attempting complete coverage.
Textbook: D. Moler, Numerical Computing with Matlab, SIAM, 2004

Title of the Course: Theory of Computation
Number of Credits: 3
Type of the Course: Theoretical
Pre-requisite: Fundamentals of Theory of computation
Objective: Automata Theory and Formal Languages, Computability Theory, Complexity Theory are the general course contents. students will (1) learn core ideas in computer science theory, including how to define and investigate a formalized model of computation, and what it means to reduce one problem to another; and (2) deepen their ability to think clearly, originally and devise correct proofs.

Textbook: M. Sipser, Introduction to the Theory of Computation, 3rd ed. Course Technology, 2012

Title of the Course: Special topics in Computer Science
Number of Credits: 3
Type of the Course: Theoretical
Pre-requisite: None

Objective: In this course students learn designing a web by ASP.net language. Web design encompasses many different skills and disciplines in the production and maintenance of websites. The different areas of web design include web graphic design; interface design; authoring, including standardized code and proprietary software; user experience design; and search engine optimization. Often many individuals will work in teams covering different aspects of the design process, although some designers will cover them all.

Textbook: Beginning ASP.NET 4 in C# and VB, by Imar Spaanjaars

Title of the Course: Computer science Project
Number of Credits: 3
Type of the Course: Practical
Objective: Students must submit an essay in the final year of their undergraduate studies.

Title of the Course: Entrepreneurship
Number of Credits: 2
Type of the Course: Theoretical
Pre-requisite: None
Objective: This course focuses on the challenges and opportunities to operate new and small businesses. Students develop an understanding of how to manage growth through planning, budgeting, and execution skills. Heavy emphasis is placed on the venture's core competencies, competitors, customer needs, industry dynamics, available resources, and operating constraints.
Textbook: Business Adventures, by John Brooks.

Title of the Course: General Persian
Number of Credits: 3
Type of the Course: Theoretical
Pre-requisite: None
Objective: Familiarizing to Persian literature and Persian poets.

Title of the Course: Islamic Thought. I
Number of Credits: 2
Type of the Course: Theoretical
Pre-requisite: None
Objective: Familiarizing to the instructions of Islam.

Title of the Course: Islamic Thought. II
Number of Credits: 2
Type of the Course: Theoretical
Pre-requisite: Islamic Thought. I
Objective: Familiarizing to the instructions of Islam.

Title of the Course: Physical Education. I
Number of Credits: 1
Type of the Course: Practical
Pre-requisite: None
Objective: Teaching sports.

Title of the Course: Physical Education. II
Number of Credits: 1
Type of the Course: Practical
Pre-requisite: Physical Education. I
Objective: Teaching sports.

Title of the Course: Analytical History of Iran
Number of Credits: 2
Type of the Course: Theoretical
Pre-requisite: None
Objective: Talking about Islam's history.

Title of the Course: The Islamic Republic of Iran
Number of Credits: 2
Type of the Course: Theoretical
Pre-requisite: None
Objective: Familiarizing with Iran's Islamic revolution, and the events which lead to it.

Title of the Course: Subjective Interpretation of the Quran
Number of Credits: 2
Type of the Course: Theoretical
Pre-requisite: None
Objective: Teaching Arabic language to students, in such a way that they will be able to read Quran's texts.

Title of the Course: Islamic Ethics
Number of Credits: 2
Type of the Course: Theoretical
Pre-requisite: None
Objective: Ethics in Islam's view.