Course		Credit	Hours per week	Description
Major	Computer Lab.	1	1.5	Introduction to Linux
	Fundamentals of Computer and Programming	4	3	C++ Programming Language
	Advanced Programming	3	3	Java Programming Language
	Data Structure	3	3	Analyzing the efficiency of algorithm, recursion data abstractions, elementary data structures such as array & records and way of representation. Stacks, queues, limited lists, trees, graphs, sorting (bubble, selection, linear insertion, tree sort heap, quick, merge), searching (binary, bst, AVL, b-trees, digital search)
	Technical English Language	3	3	English Language
	Machine Language and Assembly	3	3	Reminding use of different units of computer, definition of register, introduction of its types and its application, concept of instruction format in machine language, types of instructions, different stages of instruction execution, methods of addressing (implied, immediate, direct, indirect, indexing, base, relocation, related to content of program counter, paging). Concept of relocation, instruction by registers, instruction by memory (manipulation of half word full word, bytes and bits), jump instructions and control of loop, logical instructions, floating point manipulation subprograms, recursive subprograms.

	Discrete Structures	3	3	Preliminaries: Logic and Reasoning, Propositional, Predicate, and Fuzzy Logic, Methods of Proof, Set Theory, Functions, Combinatorial Analysis: Basics of Counting The Pigeonhole Principle, Permutations and Combinations, Recurrence Relations, Generating Functions and Counting, Relations and Ordered Sets, Relations and Their Properties, Representing Relations, Closures of Relations, Equivalence Relations, Partial Ordering, Partially-ordered sets, Totally-ordered sets, Lattices, Graphs, Graph Terminology, Representing Graphs and Graph Isomorphism, Connectivity and Euler and Hamiltonian Paths, Shortest Path Problems, Planar Graphs, Trees, Introduction to Trees and Their Applications, Tree Traversal, Spanning Trees.
	Engineering Mathematics	3	3	Engineering Mathematics
	Fundamentals of Digital Electronics	3	3	Introduction to MOSFET, NMOS and CMOS technology.
	Formal Languages and Automata	3	3	Finite state automata and regular expressions, Pushdown Automata and context free grammars, linear bounded Automata and context sensitive grammars, Turing machines and unrestricted grammars, relations between machines and grammars.
	Logic Circuits	3	3	Number systems, Boolean algebra and related rules, Logic functions and their reduction, Logic gates. Combinatorial circuits (such as comparators, coders, code converters, combiners), Sequential circuits (such as flip flops, shift registers, counters, synchronous and Asynchronous logic circuits).
	Presentation Methods of Scientific and Technical Topics	2	1.5	Study of principles of presentation.
	Algorithms Design	3	3	Algorithm design methods such as greedy, divide and conquer, dynamic programming, branch and bound backtrack, graph algorithms and analysis of algorithms and

				proof of correctness.
	Design & Implementation of Programming Languages	3	3	• Fundamental concepts underlying modern languages • Procedural/imperative • Functional/applicative (lambda calculus, ML language) • Object oriented • Concurrent
	Computer Architecture	3	3	Introduction to computer architecture, internal representation of data and instruction, memory organization, microprogramming multi-level machines, Control memory, common bus organization, stack organization and RISC and CICS structures, pipeline and basics of parallel machines.
	Logic Circuits Lab.	1	1.5	Logic gates, familiarization with several logic circuits and determination of parameters of digital IC's, Several combinational circuits (decoder, multiplexer, parity generators and checkers), displays, Study of types of flip flops, asynchronous counters, synchronous counters, familiarization with several IC counters, shift registers.
	Operating Systems I	3	3	Operating system introduction, thread and processes concurrency, deadlock and starvation synchronization, scheduling, memory management, virtual memory I/Q management and disk scheduling.
	Computer Architecture Lab.	1	1.5	Familiarization with several logic circuits and determination of parameters of digital IC's, Several combinational circuits (decoder, multiplexer, parity generators and checkers), displays, Study of types of flip flops, asynchronous counters, synchronous counters, familiarization with several IC counters, shift registers.
	Computer Networks	3	3	Introduction to Layered Architecture, Application Layer, Transport Layer Concepts, Network Layer and Routing, Data Link Layer, Physical Layer.
	Microprocessors	3	3	Definition and applications of Microprocessors, Taxonomy of Microprocessors, Programming a Microprocessor, Memory System Design, IO System Design, Design Examples,

				Example Microprocessors and Microcontrollers (including 8051, AVRs)
	Computer Networks Lab.	1	1.5	Practicing network concepts with Packet Tracer.
	Microprocessors I Lab.	1	1.5	Practicing Computer Architecture subjects practically.
Basic	Engineering Probability & Statistics	3	3	Engineering Probability & Statistics
	General Workshop	1	1.5	Introduction to electronic circuits
	Mathematics II	3	3	Mathematics
	Mathematics I	3	3	Mathematics
	Physics I	3	3	Physics
	Physics I Lab.	1	2	Physics
	Physics II	3	3	Physics
	Physics II Lab.	1	2	Physics
	Differential Equations	3	3	liner differential equations and non-liner differential equations
Specialty	Data Storage and Retrieval	3	3	The data modeling process, basic relational concepts, SQL, concept of disk and files, indexing methods.
	Software Engineering I	3	3	The context of Systems Development Projects(Context of Systems Analysis and Design Methods, Information Systems Building Blocks, Information Systems Development, Project Management), System Analysis Methods(System Analysis, Fact-Finding techniques, Use Case, Data Modeling and Analysis, Process Modeling, UML, Feasibility Analysis), Systems Design Methods(Application Architecture Modeling, Output Design and Prototyping, Input Design and Prototyping, User Interface Design).
	Artificial Intelligence	3	3	Representation of knowledge and basic paradigms of problem solving topics include game playing theorem proving natural language and learning systems. Rule base inference (forward and backward chaining). Search techniques and dealing with uncertainty using probability and fuzzy logic.
	Principles of Database Design	3	3	A presentation of the fundamental concepts used in data modeling and database implementation. The data modeling process, basic relational concepts, and the process of

				normalization, relational algebra
	Software Engineering I Lab.	1	1.5	RUP documents
	Software Engineering II	3	3	Quality Management, Software Test and Evaluation, Software Configuration Management, Web App Design, Design patterns, Refactoring, Product Metrics, Estimation for software projects, Risk Management, RUP, Agile Processes.
	Principles of Compilers Design	3	3	Lexical analysis, regular expressions and finite automata, syntax analysis, context free grammars, (SLR, LALR, CLR), semantics analysis and intermediate code generation (syntax directed translation method), code generation and runtime storage management.
	Operating Systems Lab.	1	1.5	Practicing Operating Systems subjects practically.
	Training	2	-	-
	Project	3	-	-
	Database Lab.	1	1.5	Practicing Database subjects practically.
	Internet Engineering	3	3	HTTP, HTML, XML, Introduction to javaEE, JDBC, ORM, Spring, Web application architecture.
Elective	Advanced Topics in Software Engineering	3	3	1. NoSQL concepts 2. NoSQL data architecture patterns 3. Native XML databases 4. Redis 5. Cassandra 6. Graph based Databases
	Management Information Systems (MIS)	3	3	Introduction to MIS, Management and IS, Electronic Commerce, IS Advantages and Roles, OAS, KWS, Effect of information networks on Enterprise, Decision and MRS, DSS, Expert Systems, ERP.
	Fundamentals of Cryptography	3	3	• Introduction: history of cryptography and introduction to security architecture, basic information security concepts and protection mechanisms, Confidentiality, Integrity and Authenticity (CIA). • Mathematics: basic material on information theory, Shannon criteria, Symmetric-key encryption, one-time-pad, complexity theory, number theory and background on functions, abstract algebra, and finite fields. • Block Ciphers: DES (Data Encryption Standard), AES

				(Advanced Encryption Standard), encryption modes, linear and differential attacks on block ciphers. • Hash functions: Basic constructions, Unkeyed hash functions (MDCs) Keyed hash functions (MACs), Data integrity and message authentication. • Public-key cryptography: RSA, ElGamal. • Digital signatures: security of public-key cryptography, RSA encryption and digital signature, ElGamal digital signature, DSS (Digital Signature Standard). • Key management: Protocols and mechanisms, key establishment and key management, and certification • Stream Ciphers: Stream ciphers based on LFSRs, filtering generators, combinatorial function generators, clock-control generators, shrinking generators, and correlation attack.
	Computer Simulation	3	3	Discrete and continuous events simulation and probabilities.
	Computer Networks Security	3	3	Introduction to crypto, Program security, OS security, Sandboxing, Network vulnerabilities, SSL, IPsec, Firewall, IDS, Alert Correlation, DDOS
General	Persian Literature	3	3	Persian Literature
	English Language	3	3	English Language
	Islamic Revolution of Iran	2	1.5	Islamic Revolution of Iran
	Islamic Ethics (Fundaments and Concepts)	2	1.5	Islamic Ethics (Fundaments and Concepts)
	Family and Population Knowledge	1	1.5	Family and Population Knowledge
	Nahjul-Balaghah Thematic Exegesis	2	1.5	Nahjul-Balaghah Thematic Exegesis
	Social & Political Law	2	1.5	Social & Political Law in Islam

	in Islam			
	Analytical History of Early Islam	2	1.5	Analytical History of Early Islam
	Human in Islam	2	1.5	Human in Islam
	Physical Education I	1	1.5	Physical Education
	Physical Education II	1	1.5	Physical Education