

0401111	Discrete Structures	3 CH	Prereq: None
		3	0

This course includes a review of sets, functions, relations, mathematical induction and algorithmic analysis as applied to computer science. Also included are graph theory, including minimal and maximal algorithms, and the critical path method, along with automata theory and formal languages.

0401121	Programming Fundamentals	3 CH	Prereq: None
		2	2

This course provides basic skills in problem solving related to programming. Topics covered include: simple data types, expressions and statements, program flow control structures, exception handling, and functions. Elements of Object Oriented Programming techniques are also introduced.

0401122	Object Oriented Programming Language	3 CH	Prereq: 0401121
		2	2

Object-oriented design concepts and techniques are explored. Sub-topics covered include classes, objects, function overloading, and inheritance. The course introduces object-oriented design, code reusability, and encapsulation. The techniques learned are applied in solving practical problems using a modern software development environment.

0401151	Introduction to Information Systems	3 CH	Prereq: None
		3	0

This course introduces computer and information technology systems that are used for organizational decision-making and problem-solving. The course examines: the positive interaction of systems, development concepts and application software enabling an organization to improve in quality, timeliness and competitive advantage. The course also aims to provide an introduction to systems and development concepts, information technology, and application software. It explains how information is used in organizations and how IT enables improvement in quality, timeliness, and competitive advantage.

0401153	Technology and Global Issues	3 CH	Prereq: None
		3	0

In this course the relationships between technology and global concerns are explored. Topics include: sustainable development, standards, ethics, environmental concerns and public policies related to design and development. Issues related to energy, transportation, air, and water facing both developed and developing nations are discussed.

0401211	Theory of Computation	3 CH	Prereq: 0401111
		3	0

The basic concepts of the theory of computation are studied including set theory, finite automata, context-free and context-sensitive languages, Turing machines, Church's thesis, and

incompatibility. The classes of computation complexity and their practical limitations are studied.

0401212	Data Structures	3 CH	Prereq: 0401121
		3	0

This course provides students with solid foundations in the basic concepts of programming data structures. The main objective of the course is to teach how to select and design computer structures that are appropriate for problems that might be encountered. Topics covered in this course include: linked lists, queues, stacks, trees, and other linked structures; also arrays, strings, heaps, hash tables and graphs. The course is carried out within an object-oriented framework. Java programming language is used for implementation.

0401222	Introduction to C++ programming	3 CH	Prereq: None
		3	0

This course provides basic skills in problem solving and program development using C++. Topics include: data types, expressions and statements, declarations and prototypes, program flow control structures (selection and repetition), functions and modularity, pointers and arrays, and exception handling, elements of object-oriented programming are introduced.

0401223	Advanced Object Oriented Programming and GUI	3 CH	Prereq: 0401122
		3	0

This course introduces .NET Programming using the C# programming language. Emphasis is placed on understanding the syntactical features of the language and also how to effectively use the design of the language to develop robust software. The course assumes at least one year of programming in C++ and/or Java. The course uses the features that are most important to programmers: Object Oriented Programming, strings, graphics, graphical user interface (GUI) components, exception handling multithreading, multimedia (audio, images, animation and video), file processing, prepackaged data structures, database processing, Internet and World-Wide-Web-based client/server networking, and distributed computing. C# language is appropriate for implementing Internet- and World-Wide-Web-based applications that seamlessly integrate with PC-based applications.

0401224	OO and GUI Laboratory	1 CH	Prereq: 0401223 corequisite
		0	2

All theoretical material covered in the Advanced Object Oriented Programming and GUI class will be accompanied with practical assignments and projects in this lab.

0401231	Digital Logic Design	3 CH	Prereq: 0401151
		3	0

The aim of this class is to introduce combinational and sequential circuit analysis and design, digital circuit design optimization methods using random logic gates, multiplexers, decoders, registers, counters and programmable logic arrays.

0401241	Networks and Data Communication	3 CH	3	0	Prereq: 0401151
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This course is an introduction to the fundamentals and the applications of data communications. Network architectures, topology and the ISO model will be discussed. API's and error handling LAN/equipment will be used for practical hands-on experience.

0401251	Database Fundamentals	3 CH	2	2	Prereq: 0401212
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This course introduces students to database design implementation and administration. The course discusses how to develop database applications using SQL. Additionally other topics such as XML and data mining will be discussed.

0401313	Principles of Computer Algorithms	3 CH	3	0	Prereq: 0401212
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This course examines techniques for the design and analysis of efficient algorithms useful in practice. Topics covered include: sorting (bubble, insertion, heap, merging, quick, etc.), search trees, hashing, and dynamic programming, graph algorithms (shortest paths, network flow, coloring, etc.) and NP-complete problems. Throughout the course there is a focus on performance, computational complexity, and actual implementation of the studied algorithms using C#, C++, and/or Java.

0401314	Fundamentals of Artificial Intelligence	3 CH	3	0	Prereq: 0401313
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This course includes: Introduction to artificial intelligence programming languages LISP, PROLOG, and Object Oriented Programming. Basic problem representation and heuristic searching techniques are discussed. Concept of knowledge engineering and various applications of knowledge representation schemes are studied.

0401315	Principles of Computer Graphics	3 CH	3	0	Prereq: 0401111 +0401122
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The main objective of the course is to introduce the concepts of computer graphics. Discussions start with an overview of interactive computer graphics, two dimensional system and mapping. The course then presents the most important drawing algorithm — two dimensional transformation followed by discussions of clipping, filling and an introduction to 3-D graphics.

0401318	Genetic Algorithms and Neural Networks	3	CH	Prereq:	0401314
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This course gives an introduction to AI search methods, neural networks (NNs), single-layer perceptions, ADALINE, perception learning, and multi-layer feed forward neural networks. Also discussed are supervised learning and back propagation, unsupervised and competitive learning. The course discusses Kohonen's self-organizing maps (SOM) and radial basis function network. An introduction to genetic algorithms (GAs) is presented including representation GA terminology and operators (crossover, mutation, inversion). Also given are the theory of GA, schema properties, implicit parallelism, selection, replacement and reproduction strategies ('roulette wheel', elitism, ring and tournament based selection), premature convergence, coding and scaling, GA advantages, disadvantages and applications and GA for evolving neural networks.

0401321	Web-Based Programming and Applications	2	2	3 CH	Prereq:	0401223
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This course emphasizes hands-on experience using a range of tools used in creating computer-based multimedia. It also gives general concepts of the Internet and Intranet technology, the World Wide Web, and design languages (HTML, CSS, JavaScript, and ASP).

0401324	Programming Languages Concepts	3	0	3 CH	Prereq:	0401223
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This course examines programming languages concepts beginning with a formal definition of programming languages including specification of syntax and semantics. A comparative analysis of various high-level programming languages with emphasis on the appropriateness of languages for certain applications is also taught.

0401331	Computer Architecture	3	0	3 CH	Prereq:	0401231
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The class emphasizes the following knowledge areas: digital components used in the organization and design of digital computers, serial and parallel transfer, flow of information and timing signals, design an elementary basic computer, organization and architecture of the central processing unit, designing a micro-programmed control unit, organization and architecture of input-output and memory, interfacing and communication, advanced features of architectural enhancements, and alternative architectures.

0401332	Operating Systems Concepts	3	0	3 CH	Prereq:	0401331
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The design and implementation of an operating system is studied, including process states and synchronization, memory management strategies, processor scheduling, multiprocessing, parallel processing, hardware organization, disk scheduling and file management.

0401333	Introduction to Distributed Systems	3	CH	Prereq: 0401241
		3	0	

This course is an introduction to distributed systems concepts: synchronization, communication, and fault tolerance. The course examines concepts and architecture of distributed database systems, distributed concurrency control and recovery, replicated databases, and distributed query processing.

0401342	Computer Security	3	CH	Prereq : 0401241
		3	0	

This course discusses layered communication architecture: layers, services, protocols, layer entities, service access points, information security fundamentals, attackers and their attacks, security basics, security baselines, securing the network infrastructure, web security, protecting advanced communications, scrambling through cryptography, using and managing keys, operational security, policies and procedures, security management, advanced security and other technology beyond the current state-of-the-art.

0401343	Wireless Networks	3	CH	Prereq: 0401241
		3	0	

This course discusses fundamental techniques in design of wireless networks: cellular network and protocols, medium access techniques, handoff control, wireless data works, Internet mobility and personal communication services (PCS). Third generation wideband systems, novel technologies, ad hoc networks are also discussed.

0401355	System Analysis and Design	3	CH	Prereq: 0401251
		3	0	

This module introduces the concepts and skills of system analysis and design. It includes expanded coverage of data flow diagrams, data dictionary, and process specifications. This course also introduces a variety of new software used by analysts and designers to manage projects, analyze and document systems, design new systems and implement their plans. It also introduces recent coverage of UML, wireless technologies and ERP; web based systems for commerce and expanded coverage on RAD and GUI design.

0401423	Computer Networking Programming	2	CH	Prereq: 0401241 +0401223
		2	2	

This module introduces concepts of advanced programming and practice on reusing components. It focuses on graphical user interface (GUI), multithreading, networking, and database manipulation. A selected programming language is used such as Java. This course objective is to write sophisticated Java computer network applications.

3 CH	Prereq:	0401211+ 0401324
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0401433	Compiler Design	3	0
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The design and implementation of a compiler is studied, including compiler organization, lexical analysis, searching methods and symbol tables, formal languages and grammar, parser construction, code syntax, and code generation.

3 CH	Prereq:	0401331
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0401436	Parallel Processing	3	0
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This course introduces parallel computer systems. The course covers topics such as sequential and parallel execution, synchronization, pipelines and vector processing. SIMD and MIMD machines are studied. Multi-stage and computer interconnection networks are presented. The routing and the flow control in these networks are discussed. Shared memory, multicomputer systems, caches and cache coherence are covered. Data flow systems are introduced and analyzed.

3 CH	Prereq:	0401241
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0401447	Advanced Computer Networks	3	0
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This course studies connection of multiple systems in a networked environment. Topics include: physical connection alternatives, error management at the physical level, commercially available protocol support, packet switching, LANs, WANs, wireless networks, mobile networks, VPN networks, Mobile IP, and gateways.

3 CH	Prereq:	0401251 +0401355
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0401451	Software Engineering Concepts	3	0
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This course gives a formal approach to techniques of software design, development, testing and management. Design techniques considered include formal models of structured programming, stepwise refinement, segmentation, top-down design, data abstraction, information hiding and object-oriented development. A modern programming language is used.

3 CH	Prereq:	0401251 +0401355
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0401453	Database Management Systems	2	2
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This course gives in-depth information about system implementation techniques, data storage, representing data elements, database system architecture, the system catalog, query processing and optimization, transaction processing concepts, concurrency control techniques, database recovery techniques, database security and authorization, enhanced data models for advanced applications, temporal databases, deductive databases, database technology for decision support systems, distributed databases and client server architecture, advanced database concepts, and emerging technologies and applications. This gives in-depth information about system implementation techniques.

		3 CH	Prereq:	Dept. Approval
0401454	Special Topics in Computer Science	3	0	

This course involves a critical study of theory and research related to advanced topics in computer science such as computer graphics, artificial intelligence, performance evaluation, advanced systems, programming and topics in computability, automata theory, etc. The specific topics of the seminar will be determined by the interest of both the students and the instructor.

		3 CH	Prereq:	Dept. Approval
0401491	Graduation Project	-	-	

This course centers on a project under the guidance of an instructor. Oral reports are given before the group in a seminar situation. The project involves some aspect of computer science and results will be presented in a final written report.

		3 CH	Prereq:	Dept. Approval
0401492	Practical Training	-	-	

The purpose of this course is to give actual experience in different industrial, commercial, administrative enterprises or companies. Application of what has been learned during the first three years of their study in the university is stressed. The course also teaches how to be self-confident when faced with problems.