

**Computer and Information
Science
GRADUATE COURSES
Fall 2006**

Classes begin 9/5/2006



UMass

Dartmouth

COLLEGE OF ENGINEERING

Department contact info: 508.999.8265
Dr. Boleslaw Mikolajczak, Chairperson
Dr. Jan Bergandy, Graduate Program Director

CIS 531	Software System Specification G. Xie (gxie@umassd.edu) Monday, Wednesday 8:00-9:15 PM, Dion 101	CIS 570	Advanced Computer Systems B. Mikolajczak (bmikolajczak@umassd.edu) Tuesday, Thursday 6:30-7:45 PM, Dion 101
CIS 552	Database Design P. Bergstein (pbergstein@umassd.edu) Monday, Wednesday 5:00-6:15 PM, Dion 101	CIS 577	Computer Networks V. Vokkarane (vvokkarane@umassd.edu) Tuesday, Thursday 8:00-9:15 PM, Dion 101
CIS 560	Theoretical Computer Science H. Xu (hxu@umassd.edu) Tuesday, Thursday 5:00-6:15 PM, Dion 101	CIS 602	Special Topics: Advanced Bioinformatics L. Shen (lshen@umassd.edu) Tuesday, Thursday 3:30-4:45 PM, Dion 105
CIS 563	Multi Agent Systems X. Zhang (x2zhang@umassd.edu) Monday, Wednesday 3:30-4:45 PM, Dion 101	CIS 600	Master's Project
CIS 564	Mobile Robotics R. Balasubramanian (rbalasubrama@umassd.edu) Monday, Wednesday 6:30-7:45 PM, Dion 101	CIS 690	Master's Thesis

Course Descriptions

CIS 531 three credits

Software System Specification

3 hours lecture

Prerequisite: CIS 480 or equivalent

Formal foundation of the theory and practice of software specification, production of correct, consistent and reliable software systems by expressing the requirements of the system in formal ways. Formal and informal requirements analysis and specification techniques, the relation of analysis and specification to concerns of validation and verification, maintenance, and reusability.

CIS 552 three credits

Database Design

3 hours lecture

Prerequisite: CIS 452 or equivalent, or permission of instructor

The relational, hierarchical, and network approaches to database systems, including relational algebra and calculus, data dependencies, normal forms, data semantics, query optimization, and concurrency control on distributed database systems.

CIS 560 three credits

Theoretical Computer Science

3 hours lecture

Prerequisite: CIS 360, 361 or equivalents

Theoretical basis of the development of computer science. The course details particular formalisms used in the design of hardware and software systems, intrinsic limitations of computation are described. Advanced topics of automata theory and analysis of algorithms are included. The course also covers Turing machines, the halting problem, models of computation, intractable computations, and polynomial reductions. P vs. NP, parallel algorithms, various formal descriptions and specifications of programs and computations, and proofs of program correctness and interactive proof systems.

CIS 563 three credits

MultiAgent Systems

3 hours lecture

Introduction to multiagent systems and distributed artificial intelligence. The course examines the issues that arise when groups or societies of autonomous agents interact to solve interrelated problems. Topics include defining multiagent systems and their characteristics, reasoning about agents' knowledge and beliefs, distributed problem solving and planning, coordination and negotiation, the organization and control of complex, distributed multiagent systems, learning in multiagent systems, and applications in the following domains: internet information gathering, electronic commerce, virtual markets, workflow

management, distributed sensing network, distributed planning and resource allocation.

CIS 564 three credits

Mobile Robotics

3 hours lecture

Prerequisite: Graduate standing

The theory, software and hardware for autonomous mobile robots. Reactive behavior-based, deliberative goal-based and utility-based robotic architectures will be presented. Control and planning under bounded resources will be covered. Interaction with environment using sensors and actuators, robot kinematics and dynamics, reinforcement and evolutionary learning techniques for intelligent robots, interaction of competing and cooperating multi-robot systems will be presented. Various applications of mobile robots will be explored.

CIS 570 three credits

Advanced Computer Systems

3 hours lecture

Prerequisite: CIS 314 or equivalent

In depth treatment of current computer systems, with performance issues at the center of an analytical approach. The course explores operating system software and the interrelation between architecture and system software. Advanced topics of compiling, assembly, linking and loading of high-level language software are included. The course treats mechanisms of IO and the memory hierarchy, various features of traditional machines, advanced features of modern machines such as RISC and multi-processor machines, and file systems and networked and distributed systems such as inter- and intra-nets. Throughout, performance issues are at the center of an analytical approach.

CIS 577 three credits

Computer Networks

3 hours lecture

Prerequisite: CIS 475 or permission of instructor

Analysis and modeling of centralized and distributed computer networks. Queuing network analysis, principles of network design, software considerations, and design of computer networks are also studied.

CIS 600 three credits

Master's Project

Prerequisites: CIS 560, 570, and 580

Provides an experience in the development of a detailed, significant project in computer science under the close supervision of a faculty member, perhaps as one member of a student team. This project may be a software implementation, a design effort, or a theoretical or practical written analysis. Public presentation of the master's project and evaluation by two faculty other than the project supervisor are required.

CIS 602 three credits

Special Topics in Computer Science: Advanced Bioinformatics

Advanced coverage of computational approaches used in bioinformatics. The course focuses on algorithmic challenges in analyzing molecular sequences, structures, and functions. It covers the following topics: Sequence comparison, assembly and annotation. Phylogenetic analysis. RNA secondary structures. Protein structure comparison, prediction, and docking. Microarrays, clustering, and classification. Genome, Hapmap, SNPs, and phenotypes. Proteomics and protein identification. Determining protein function and metabolic pathways.

CIS 601, 602, 603 three credits each

Special Topics

Offered as needed to present advanced material to graduate students.

CIS 690 three credits

Master's Thesis

Prerequisite: Permission of the Graduate Program Committee, based on performance in CIS 600, approval of proposed topic, and support of a faculty advisor and two faculty readers. Research leading to submission of a formal thesis. This course provides an optional thesis experience, which may be based on the student's Project in a more intense form or be a sequel effort of a different character. In exceptional circumstances, the student may earn up to six thesis credits, if approved by the Graduate Program Committee. Graded A-F.