Welcome to
BS in Computer Science

Open House
October 22, 2005

Computer and Information Science Department
http://www.umassd.edu/engineering/cis

Dr. Boleslaw Mikolajczak, Chair
Overview

◆ What matters in career decision-making?
◆ What are professional occupations of Computer Science?
◆ What are employment opportunities for Computer Science graduates?
◆ What is the discipline of Computer Science?
◆ BS in Computer Science at UMASS Dartmouth.
What matters in career decision making?

- Computer Science and Software Engineering dominate professional job market

- The most important career decision variables:
  - Do you like to learn new and interesting issues of problem solving using computers? **YES**
  - What is predicted growth of job market? **VG/EX**
  - What is frequency of job offerings? **EX**
  - What are average starting salaries? **$50K**
What are Professional Occupations of Computer Science?

- according to Department of Labor Statistics (www.bls.gov/oco/)
  - Systems Analysts, Computer Scientists, and System Administrators (ocos042.htm)
  - Computer Programmers (ocos110.htm)
  - Computer Software Engineers (ocos267.htm)
  - Computer Support Specialists (ocos268.htm)
Employment Growth for Computer Science graduates 2002-2012; BLS (www.bls.gov/oco/)
What are Employment Opportunities for Computer Science graduates?

- **Summary** - job growth in Computer Science professional occupations during 2002-2012 by 76% from 2,467 to 4,351 thousands, i.e. by 1.9 millions NEW jobs.

- The above numbers do not count job replacements needed due to retirements and other decisions to leave the market place.
Employment Opportunities continued

- **Raytheon** - Portsmouth, RI; Bedford, MA
- **APC** - American Power Conversion, RI
- **Microsoft, Lucent Technologies** - in MA
- **Naval Undersea Warfare Center** - Newport, RI
- **EMC** - Mansfield, MA
- **Sun Microsystems** - MA
- **General Dynamics** - Taunton, MA
- **Fidelity Investments, Thomson Investments** - Boston;
- **Textron Financial** - Providence; **Goldman Sachs** - NY
- **Meditech** - MA and Fall River
- **Various software development consulting houses**
What is the Discipline of Computer Science?

Study of algorithmic mechanisms of computational processes, i.e. how to solve diverse problems of society by means of computers.

“It has often been said that a person does not really understand something until he teaches it to someone else. Actually a person does not really understand something until he can teach it to a computer, i.e. express it as an algorithm.”

Donald Knuth
What are sub-disciplines of Computer Science?, ctnd.

- Algorithms and Data Structure
- Programming Languages
- Computer Architectures
- Numerical and Symbolic Computation
- Operating Systems
- Software Methodology and Engineering
- Databases and Information Management
- Artificial Intelligence/Intelligent Systems/Robotics
- Human-Computer Communication
- Net-Centric and Internet Computing
- Computational Science
What Computer Scientists do...

- Design algorithms
- Implement algorithms in various programming languages
- Design, implement, test, and maintain marketable product, called software
- CS majors are like English majors - they write creative pieces of their art (except to solve problems!)
Computer Scientists include...

- Software Engineers
- Systems Programmers - assemblers, macro assemblers, compilers, and operating systems
- Computer Network Specialists
- Information System Programmers - for business, management, and process control
- Object Technology Specialists - Java and C++
- Database System Specialists - decision-support and expert systems based on database machines
- Web Software Developers
Exciting New Areas in Computer Science

- Internet and Intranet computing
- Security of computer and information systems
- Programming support for electronic commerce
- Mobile and Wireless computing
- Optical and Multimedia-based computer networks
- Agent-based computing
- Bioinformatics, bio-technology, bio-engineering
- Software factories for software development
- Knowledge discovery through data mining and visualization
- Mobile Robotics
- Intelligent Information Systems
BS in Computer Science at UMASS Dartmouth

- Accredited by CAC of the ABET since 1988 - [www.abet.org](http://www.abet.org)

- Program’s Goals and Outcomes

- Computer Science Curriculum

- Program Features

- Faculty - 13 FT tenure-track faculty
BS in Computer Science - Four Program Goals

- Graduates who succeed as practicing computer scientists
- Graduates who succeed in advanced study in computer science
- Graduates who adopt and evolve in complex technological environments such as those found in workplace
- Graduates who influence the development of professional, ethical, and legal aspects of computing
BS in Computer Science - Program Outcomes

- Are able to individually solve problems in algorithmic manner with given computer resources and constraints
- Apply their knowledge of mathematics, science, and computer science to solve technical problems
- Apply analytic and empirical techniques to evaluate technical problems and their solutions
- Design system, component, or process to meet specified requirements
- Participate as an effective member of a problem solving team
Program Outcomes, continued

- Identify, formulate, and solve problems encountered when constructing solutions involving information technology
- Articulate the social, professional, ethical, and legal aspects of a computing milieu
- Evaluate the impact of computing and information technology at the global societal level
- Analyze contemporary issues related to the evolving discipline of computer science
- Communicate effectively
- Apply modern skills, techniques, and tools during professional practice
- Evaluate the impact of computing and information aspects of a computing milieu
- Articulate the social, professional, ethical, and legal technology
- Identify, formulate, and solve problems encountered
Computer Science Curriculum

- 120 semester credits to graduate (4 years)
- at least 53 credits in **computer science:**
  - required courses (41 credits) and
  - elective courses (12 credits)
- 17 semester credits in **mathematics** (calculus, discrete structures, probability and statistics)
- 14 semester credits in **sciences** (*PHY*, *CHM*, or *BIO*)
- 9 semester credits of **English** (technical communication)
- 18 semester credits of **humanities and social sciences**
- 9 semester credits of **FREE electives** (minor in another discipline)
BS in Computer Science - program features

- Program is **affordable**
- Program is **flexible** to complete minor in another discipline
- $CS = \textit{software track} + \textit{systems track} + \textit{foundations track}$
- intellectual control over systems/software development
- focus on design in computer systems development
- object-oriented and procedural programming
- group software/systems projects
- courses with required and supervised labs
- quality of lecture/lab instructions - 32/16 section size
- faculty active in research and professional development
Program Features continued

- Curricular and career advising process
- Comprehensive tutoring system
- Honors program: project and honor courses
- BS/MS in Computer Science Option in 5 years
- Integration of professional and general education
- Integration of enduring methodologies and evolving technologies - *to know, to understand, to apply*
- Cooperative Learning & Internship Program
- Two computing platforms - Windows and Linux
Program Features

- Specialized research labs: concurrent computing, computer vision, mobile robotics, neural and intelligent systems, computer networks, databases, image processing, software engineering
- Student Chapter of the Association for Computing Machinery
- Student Computer Game Design Club
- Student Linux Users Club
- Students can participate in ACM programming contest
- Students can participate in IEEE Design Competition
CIS Department - 13 Faculty + 4 staff

- **Dr. Emad Aboelela** - computer networks, multimedia, sensor networks, systems software
- **Dr. Ramprasad Balasubramanian** - computer vision, image processing, data visualization, operating systems
- **Dr. Jan Bergandy** - distributed systems, software engineering, object methodology and technology
- **Dr. Paul Bergstein** - object-oriented software development, databases
- **Dr. Eugene Eberbach** - evolutionary computing, mobile robotics
- **Dr. Boleslaw Mikolajczak** – parallel and distributed computing, formal methods in software development
CIS - Faculty, continued

- **Dr. Li Shen** - computer vision, image processing with applications in medicine, bio-informatics
- **Prof. Richard Upchurch** – software engineering, human-computer interaction
- **Dr. Iren Valova** - neural networks, bio-informatics
- **Dr. Vinod Vokkarane** - optical and wireless computer networks
- **Dr. Haiping Xu** – software engineering, multi-agent systems
- **Dr. Shelley Zhang** - artificial intelligence, multi-agent systems, complex negotiations
- **Dr. Gaoyan Xie** - software development, software testing

- One new faculty position for Fall 2006
Computer Science majors - Fall 2005

- 320 students in both Computer Science programs
- 110 students in MS in Computer Science program
- 210 students in BS in Computer Science program
Thank you for your attention !!!

Questions