UMBC at a Glance

- One of eleven USM campuses, one of three research universities
- About 13,000 students, including 2500 grad students
  - 860 CS majors (and growing!)
  - 325 CE majors (and growing!)
  - 632 IS majors (and growing!)
  - ➔ About 17% of our undergraduates are in a computing major!
- About 475 faculty, in 28 departments
- Famous for diversity, and chess, but not football!
CS vs. CE vs. IS

CS: science of computation
- Theory
- Software
- Many CS majors become software engineers

CE: creation of computational devices
- Hardware
- Embedded software
- Many CE majors become hardware engineers

IS: applications of technology for end users
- Human-centered computation, usability
- Business/enterprise applications
- Many IS majors take jobs in industry, managing systems
Why Computer Science?

- It focuses on problem solving
- It's a broad discipline
  - Pick your mix of engineering, science, math and the arts
- It's practical
  - strong job market
- It's important
  - computer scientists create the technology that is changing the world
- It's interesting
- It's fun!
Why CS@UMBC?

- Fully accredited program
- Strong curriculum
- Excellent research faculty
- First-rate computing facilities
- Large & diverse community at UMBC
- Other IT program options if a student’s goals or interests change
  - Computer Engineering, Information Systems, Business Technology Administration, Bioinformatics, Interactive Entertainment (Visual Arts), ...
- Proximity to numerous IT potential employers, government agencies, “cybersecurity central”
CS Course Requirements

- 44 credits in Computer Science courses
- 18 credits in Mathematics courses
- 12 credits in Science courses
- 24-33 credits in General Foundations
- 13-22 free elective credits
“Zeroth” Programming Courses

- **CMSC 104 Problem Solving & Programming**
  - Being phased out...
  - Programming for non-majors and students without precalc math preparation.

- **CMSC 101 Computational Thinking and Design**
  - For all computing majors (CS, CE, IS)
  - Team-based design experience, broad overview of computing disciplines
“First” Programming Courses

CMSC 201 Computer Science I
- Procedural programming in Python: functions, pointers, basic data structures, code design.
- STARTING FALL 2012: NO PRIOR PROGRAMMING EXPERIENCE REQUIRED!

CMSC 202 Computer Science II
- Object-oriented design in Java: objects, class design, inheritance, polymorphism
Required Advanced Courses

- CMSC 411 Computer Architecture
  - CPU design
- CMSC 421 Operating Systems
  - Principles behind modern operating systems
- CMSC 441 Algorithms
  - Design & analysis of algorithmic solutions
Advanced Electives (selected)

Systems
- CMSC 461 Database Management Systems
- CMSC 481 Computer Networks
- CMSC 483 Parallel and Distributed Processing

Programming Languages
- CMSC 431 Compiler Design Principles
- CMSC 433 Scripting Languages
- CMSC 445 Software Engineering

Theory & Applied Mathematics
- CMSC 442 Information and Coding Theory
- CMSC 455 Numerical Computations
Advanced Electives (cont)

**Security**
- CMSC 426 Computer Security
- CMSC 443 Cryptology
- CMSC 444 Information Assurance
- CMSC 482 Computer & Systems Security

**Intelligent Systems**
- CMSC 471 Artificial Intelligence
- CMSC 473 Natural Language Processing
- CMSC 477 Multi-agent Systems
- CMSC 478 Machine Learning
- CMSC 479 Robotics

**Graphics**
- CMSC 435 Computer Graphics
- CMSC 436 Data Visualization
Special Topics Courses

- Covers recent “hot” developments in IT
- Keeps curriculum up to date
- Recent special topics offerings
  - Mobile Computing
  - Data Visualization
  - Sensor Networks
  - Electronic Voting
  - Computer Graphics for Games
  - Service Oriented Computing
  - Quantum Computing
  - Semantic Web
  - Computer Forensics & Intrusion
Game Development Track

- Computer Games industry made $18.5 billion in 2009
  - ~20 game companies in DC/MD/VA area
  - Games need programmers
  - Graphics, AI, Network, Database, Parallel programming, ...

- CMSC Game Development Track
  - CMSC BS degree with specific electives
    - Often taught by instructors working in the industry
  - Capstone class to build a game together with Visual Arts students

- Game track students still earn a BS in CS and are qualified for any job in the CS industry!
  
- See http://gaim.umbc.edu for more information
Cybersecurity @ UMBC

Cybersecurity is Maryland’s “hot” profession
  - NSA, NIST, CyberCommand, DISA, major banks, and more located here
  - UMBC maintains close relationships with these organizations for internships, career services, and workforce preparation
  - Securing Cyberspace requires special expertise such as Security, Privacy, Networks, Cryptography, Programming, ...

Undergraduate Cybersecurity @ UMBC
  - CMSC BS degree with “information assurance” concentration
    - Four required courses on cybersecurity
  - Cybersecurity scholarships available – visit cisa.umbc.edu for details
  - UMBC’s Cybersecurity Learning Community provides a unique immersive learning environment for cybersecurity students.

See http://cybersecurity.umbc.edu for more information about cybersecurity@umbc!
CMPE BS Program

More hardware oriented than Computer Science

More physics and applied math

Hands-on experience with electronic equipment, VLSI and FPGA design tools, including CADENCE, Xilinx low-power, mixed signals, bio-electronics.

Communication track covers wireless, optical communications, nano-electronics and photonics, bio-sensors, neural-sciences, bio-med signal processing, meta-materials, acoustics, NSF mid-IR ERC -summer research.
CMPE Requirements

- ~124/125 total credits required
  - 17 credits in Computer Science
  - 25 credits in Computer Eng.
  - 25 credits in Mathematics
  - 12 credits in Physics and Chemistry
  - 12 credits in technical electives
  - 24-33 credits in General Foundations
  - 3 credits in Technical Writing
What Do Students Need for Success?

- Problem-solving skills!
  - Abstract thinking
  - Design strategies
- Calculus
  - If students place into precalc or earlier, they will be significantly behind in their entry courses
- Willingness to ask questions and ask for help
- Good work habits (start projects early, don’t need excessive handholding)
Top Ten Tips for Freshmen

10. Understand the **academic integrity** code, and DO NOT cheat or plagiarize

9. Get to **know your professors**

8. Get to **know your fellow students**

7. Find an **extracurricular** activity that energizes you

6. Don’t be afraid to **ask questions** (inside and outside of class)

5. **Manage your time** wisely -- buy an organizer and use it!!

4. Get enough **sleep**

3. **Read the syllabus** IN EVERY CLASS

2. **Turn in EVERY ASSIGNMENT** in EVERY CLASS

1. **Go to class - EVERY DAY!!!**