CS/EE 1000

Course Administration and Computer Degree Overview
Welcome!

Welcome to:
- {EE, CS} 1000 : Explorations in Computing
- The {ECE, CS} Department
- Michigan Tech
- The Academic World
- “A Nice Place to Live”
About Your Instructors

- Linda Ott
  - Computer Science
  - Background, Current Responsibilities
  - Office: Rekhi 211
    - Hours: 2:00 – 3:00pm  MW or by appointment
About Your Instructors

Kit Cischke
- Electrical and Computer Engineering
- Background, Current Job Responsibilities
- Office: EERC 222
  - Hours: 9:00 - 10:00 AM MWF or whenever the door is open
Course Requirements

- Attendance (20%)
  - We want you to show up

- Homework (50%)
  - You learn by doing

- Alumni Communication (30%)
  - Find out what you’ve gotten yourself into
Course Topics

- Overview of Computing Degrees (This)
- Why are computers digital?
- Intro to Digital Logic and Binary Arithmetic
- Intro to Processor Architecture, Algorithms, Security, HCI, AI and other Computer Science-y topics
- Career Opportunities: Co-ops, the Enterprise Program
- Other stuff as time permits
What We Expect From You

- That you come to class
- That you do the homework
- That you at least pretend to be excited
- That you wave at us in the hall
- That you remember that this is just a 1-credit overview class and not to stress about it, BUT don’t completely forget about it either.
Degrees and Careers in Computing

- Here begins an overview of computing-related degrees and careers. They are divided up the way that MTU divides them.
- However, distinctions in real life are hardly ever this clear, and all of these lines are very, very fuzzy.
- Pursuing a degree in one does not, in any way, prohibit you from obtaining a satisfying career in one of the others.
  - Kit got a EE degree, did hardware design and wrote lots of software.
  - Linda got a CS degree and has done CS and SE
Electrical and Computer Engineering Programs

- Electrical Engineering
  - Concerned with the *physical* design of computers and their circuitry
  - Transistors, wires, communications channels, wireless communication, power distribution, etc.

- Computer Engineering
  - Concerned with the *behavioral* design of computers, their software and the interface between HW and SW
  - Spend equal time in the EERC and Rekhi
Major: Electrical Engineering

How are EEs involved in computing?

- Physical design/test of processors, circuitry, interconnects
- Power distribution
- Integration of digital and analog circuitry
- Sometimes you just fall into it.
EE Coursework

- Basic intro to Java and Assembly language.
- Other courses are generally not computer-intensive.
Major: Computer Engineering

- Understand the HW-SW interface
- Understand behavior of digital circuits, processors, interconnects
- Write software at a high or low level
- Maybe doing “hardware/software co-design”
- Jack of all (computing) trades
CpE Coursework

- The whole spectrum of programming:
  - Hardware Description Languages
  - Assembly Language
  - System-level C (especially embedded applications)
  - Java and other application-oriented languages

- Computer Hardware courses
  - Architecture, busses, embedded systems

- Lots of EE classes in signal processing, circuits, electronics
  - But no power, emag, etc. -- the “traditional” EE disciplines
ECE Graduates Work At:

- Boston Scientific
- Raytheon Missile Systems
- Lockheed Martin
- GE Aerospace/Medical
- Microsoft
- Intel
- IBM
- Chrysler/GM/Ford
- Unisys
- Hitachi Global Storage
- Seagate
- MIT Lincoln Labs
- Motorola/Freescale
- Swell Software
- MTU
Computer Science Programs

- Computer Science
  - Computer Science
  - Information Systems
  - Software Engineering
  - Education
  - Applications
- Computer Systems Science
- Software Engineering
Major: Computer Science

- Understand and design computer software and computational processes
- Includes
  - Theory
  - Experiment
  - Engineering design
- Requires
  - Creativity
  - Precision
  - Sound reasoning
- 5 concentrations
Careers: Computer Science

- Specialty areas include...
  - Computer architecture
  - Software systems
  - Graphics
  - Artificial intelligence
  - High performance computing
  - Software engineering
  - Human computer interaction

- Careers in...
  - Computing industry, Telecommunications, Government, Banking, Automotive, Financial, Commercial, Electronics, Gaming, Toy industry
Concentration: Computer Science

- Least restrictive concentration
- Most flexibility in choosing technical elective
- Gives the possibility for more breadth
- Recommended concentration if you plan to go to graduate school
Concentration: Information Systems

- Focuses on business applications
- Combines computer science with business expertise
- Requires business courses
Concentration: Software Engineering

- Focuses on the development of large-scale software systems
- Requires senior-level software project courses
Concentration: Computer Science Education

- Earn secondary education certificate to teach computer science
- Requires courses in both education and computer science
Concentration: Applications

- Acquire a strong technical expertise in computer science while specializing in an application area that interests you.
- Application area must be approved by CS department’s undergrad curriculum committee.
Major: Computer Systems Science

- Develop a broad understanding of:
  - Operating systems
  - Networking
  - Administration
  - Performance Analysis
  - Security

- Learn to…
  - Identify and maintain appropriate combination of hardware and software to meet the needs of the end user
  - Understand core concepts that stand the test of time, stay abreast of change, and lead to continued professional development
Careers: Computer Systems Science

- Network administrator
- System developer
- Information technology specialist
- Information technology management
- Computer system architect
Major:
Software Engineering

- Apply engineering principles to software design, development, and maintenance.
- Named as the fastest-growing occupation in the nation by US Dept of Labor

Emphasis on:
- Course work
- Applications
- Project experience
- Interaction with industry
Careers: Software Engineering

- Data Management
- Telecommunications
- Food production
- Factory control
- Robotics
- Pharmaceuticals
- Defense
- Toys
- Security
- Biomedical instrumentation
- Sound design
- Just to name a few…
Computer Science Programs

The good news…

- The first 2 years for all of our programs are nearly identical
- Take your time, take a few classes, learn about what interests you most
Where some of our graduates work…

- Creative Solutions
- DaimlerChrysler
- Digital Magic
- Dow Corning
- Google
- Hewlett-Packard
- Ford
- IBM
- N-Space
- Raytheon
- Sentry Insurance
- Verizon
- Westinghouse Electric
So How Do You Decide?

- That’s what this class is really about.
- We’ll be talking a little about each of these things, and relating each topic to one of these degrees/careers.
  - Kit does mostly the ECE stuff, Linda does the CS stuff
- Ask!
- Don’t be afraid to change your mind.
- And again, your degree will not define you.
Questions?