

IT Education: An Interdisciplinary Approach



David L. Spooner
Rensselaer Polytechnic Institute

What is IT?



- Useful working definition:
 - IT is the study of how to exploit computing and communications technologies to solve problems in any discipline.

Characteristics of IT



- It applies to any major or degree program in a university.
- It is not just computer science and computer systems courses.
- It is not just learning to use computer tools.
- It is interdisciplinary.
- It emphasizes problem solving.

Design Principles

- Keep it interdisciplinary
 - the core set of courses is interdisciplinary
 - apply it to anything and everything
- Attract new students
 - IT students are not the same as computer science and systems students
- Keep the focus technical
 - students must deal with complex and technical problems and solutions

One Way to do It



- IT Core Courses
 - introduce technology
 - thinking about broader issues of using IT
 - develop group problem solving skills
- Second Discipline Concentration
 - application area for the IT
 - second area of expertise
 - think about how IT is applied

IT Core Courses

- Technology Courses
 - Two course programming sequence
 - Two course hardware and systems sequence
 - Internet and WWW course
 - Database/information systems
- Humanities and Social Science Courses
 - The IT Revolution: Myth or Reality?
 - Politics and Economics of IT
 - Human Computer Interaction
 - Creative Design Studio

IT Core Courses (continued)



- Other Courses
 - Managing IT Resources
 - Capstone Project
 - Probability, Statistics and Modeling
- Related Courses
 - math electives including calculus
 - science electives
 - Science of IT
 - humanities and social science electives

Second Discipline

- Sponsored by an academic department
 - Explore an application area in depth
 - May include additional math, science, social science & humanities courses
 - Many include a second discipline-specific capstone course
- School of Architecture
 - Architecture
 - School of Engineering
 - Aeronautical Engineering
 - Civil Engineering
 - Communication & Networks
 - Computer Hardware
 - Decision Sciences
 - Industrial Engineering
 - Information Engineering
 - Mechanical Engineering
 - Robotics & Manufacturing

Second Discipline (continued)

- School of H&SS
 - Arts
 - Communications
 - Economics
 - Pre-Law
 - Psychology
 - Science & Technology Studies
- School of Management
 - Entrepreneurship
 - Finance
 - Management Info Systems
 - Marketing
- School of Science
 - Bioinformatics
 - Cheminformatics
 - Ecoinformatics
 - Machine Learning
 - Medicine
 - Multimedia Data & Knowledge Management
 - Software Usability
- Interdisciplinary
 - Electronic Commerce
 - Simulation-Based Science & Engineering

Communication & Networks

- Multivariable Calculus & Matrix Algebra
- Differential Equations
- Electric Circuits
- One of:
 - Operating Systems
 - Discrete Time Systems
- Computer Communication Networks
- Signals and Systems
- Communication Systems
- One of:
 - Network Programming
 - Voice & Image Processing

Mathematics Elective: Calculus II

Science Elective: Physics I

Science Elective: Physics II

Medicine



- Intro to Biology
- Organic Chemistry I
- Physics I
- Management Information Systems
- Cell & Molecular Biology
- Organic Chemistry II
- Physics II
- Computer Instrumentation Interface in Medicine

Mathematics Elective: Calculus II
Science Elective: Chemistry I
Science Elective: Chemistry II

Implementation Issues



- Support from across the university is critical
 - design of the curriculum
 - day to day operations
- Organizational structure must support the interdisciplinary nature of IT
 - not a department in a school of the university
 - curriculum committee with representatives from across the university

Other Issues to Address



- Selection of second disciplines is difficult for many students
 - seminar series on second disciplines
 - strong advising
- Job Placement of Graduates
 - educate potential employers about the degree
 - engage Career Placement Center
 - strong student interest in internships and co-ops

More Issues



- Need a financial model that encourages departments to participate
 - offering courses (IT Core + Second Discipline)
 - advising students
- Need a robust technological infrastructure
 - integration of technology throughout the curriculum
 - access to computers and the internet everywhere

Final Thoughts

- Student demand for IT programs is high.
- Industry is supportive.
 - internships, co-ops, employment
- It is not necessary to create many new courses to build an IT program.
 - repackage courses from across the campus
- A Minor in IT and a professional Masters in IT are attractive to many students.
- An interdisciplinary approach to IT offers many opportunities for creative curriculum design.