

# The Information Technology Program

UNIVERSITY OF MASSACHUSETTS AMHERST

Home

About the  
IT Program

Courses

For Business  
Partners

For Faculty

For Students

Contact Us

## What's New?

### 20 IT Courses Offered in 2001

August 2001 - Thanks to a Commonwealth Information Technology Initiative (CITI) grant from the Massachusetts Board of Higher Education, 20 undergraduate IT courses are being offered at the University of Massachusetts Amherst - 12 during the Fall 2001 semester. Many of the new classes have never been offered before. Short descriptions of them may be found on the [courses page](#).

### Pushing Ahead: A Status Report

August 2001 - With support from students, University faculty, staff and administrators are preparing to ask the Faculty Senate to approve an IT program as part of a formal, university-wide curriculum. The filing is expected in September.

Spring 2001 - Little more than a year after the first formal discussion, the Information Technology Program at the University of Massachusetts at Amherst is rapidly taking shape. Recent developments highlight an ambitious effort with potential to reach 177,000 students in Massachusetts' three public higher education systems. The program may rank among the Commonwealth's most important educational initiatives.

Read: "Pushing Ahead: An IT Program Status Report"

(PDF format, 60K, requires [Adobe Acrobat Reader](#))

### New Round of Course Proposals

Fall 2001 - A new solicitation for CITI-funded IT courses will be made soon, once funds are allotted through the Board of Higher Education. While a new request for proposals has not yet been issued, last year's proposal process is available here. [Read more.](#)

### Visit News Archives

## The Information Technology Program

Information technology is affecting every aspect of life and work. The goal of the Information Technology Program at UMass Amherst is to equip any interested student to confidently employ IT, and to secure an intellectual platform from which to develop capacity to innovate, using IT in his or her field.

The first IT courses were offered in Fall 2000. More courses are available this Fall, as part of a \$1.68 million grant from the Massachusetts Board of Higher Education to establish the [Commonwealth Information Technology Program](#).



UMass Amherst is developing a new undergraduate IT program -- the first in the state public higher education system -- to be announced this Fall.

Students in the College of Social and Behavioral Sciences using IT for policy analysis work

[More about the IT Program ...](#)

## Contact Us

### For more information contact:

Professor Bill Israel, Chair  
UMass Information Technology Task Force  
Journalism Department  
108 Bartlett Hall  
University of Massachusetts  
Amherst, MA 01003-0520

Phone: (413) 545-5923

Fax: (413) 545-3880

[bisrael@journ.umass.edu](mailto:bisrael@journ.umass.edu)

[Home](#) | [About the Program](#) | [Courses](#) | [For Business Partners](#) | [For Faculty](#) | [For Students](#) | [Contact](#)



Copyright ©2001 University of Massachusetts, Amherst  
Produced and maintained by the Information Technology Program.  
This is an official page of the University of Massachusetts Amherst Campus.

34

# The Information Technology Program

UNIVERSITY OF MASSACHUSETTS AMHERST

[Home](#)[About the IT Program](#)[Courses](#)[For Business Partners](#)[For Faculty](#)[For Students](#)[Contact Us](#)

## IT Program Undergraduate Courses

Thanks to the Commonwealth Information Technology Initiative (CITI) grant from the Massachusetts Board of Higher Education, 12 undergraduate (and a few graduate) IT courses are being offered at the University of Massachusetts Amherst in Fall 2001, including one course previously listed.\* Many of the courses have never been offered before. They are assembled here, as a group, for the first time. Although no formal undergraduate IT minor or certificate program is yet in effect, the offering of the courses represents a first step toward such a program.

### Fall 2001

Gateway IT Course:

Computing Foundations to Frontiers - RES EC 197A (Caffery)

Contemporary Internet Communications: Writing, Information Design and Research on the Web - ENGL 297B / ECE 297B (Nelson and Reising)

Contemporary Legal and Ethical Issues in Cyberspace - HRTA 394E (Enghagen)

Digital Re-Presentation - ART 497D/697D (Galvis-Assmus, Lugosch, Schlappi)

Economic Issues of Contemporary Information Technology (Field)

History of Electronic Media and Information Technology - COMM 234 (Paredes)

Image Processing, or What's Under the Hood of Photoshop? - CMPSCI 370 (Schultz)

Information Technology in Biology Education - BIOL 5XX (Brewer and Hoagland)

Information Technology in Social and Historical Perspective - JOURN 397T (Israel, Allen, Schlesinger, Paredes, Sims, Huntemann, Watson, Dienes)

Introduction to Business Information Systems - SOM 210 (Sorcinelli)

Introduction to Problem Solving with Computers - CMPSCI 121 (Lehnert and Fisher) \*

Representing, Storing, and Retrieving Information - CMPSCI 195A (Barrington and Verts)

### Spring 2002

Information Design - ART 297H (Campos, Giloth, Goldwater, Hosmer, Hudson, Turre, Zinn)

Information Systems in Public Health - (Bigelow and Puleo)

### Courses previously given

#### Spring 2001

Gateway IT Course: Computing Foundations to Frontiers - RES EC 197A (Caffery)



Information Design - ART 297H (Campos, Giloth, Goldwater, Hosmer, Hudson, Turre, Zinn)

Information Technology Applications in Public Policy Analysis - PUBP&A 697E (Schweik)

Intelligent and Integrated Design Systems - MIE 597O (Terpenney and Woolf)

Introduction to Problem Solving with Computers - CMPSCI 121 (Lehnert and Fisher) \*

Multimedia Systems - ECE 197H (Burlison)

Representing, Storing, and Retrieving Information - CMPSCI 145 (Barrington and Verts)

Writing and Emerging Technologies - ENGL 391 (Stores and Edwards)

## Course Descriptions

### Gateway IT Course: Computing Foundations to Frontiers - RES EC 197A (Caffery)

Provides introductory training and a fluency in the discipline, to help the student to apply IT to her or his own major or career. Course develops understanding of contemporary computing tools, IT concepts, and higher-order skills like those needed to perform needs assessment and systems analysis and troubleshooting. It also introduces emerging technologies and the needs they fill, and seeks to develop a context for understanding the role of IT in society, and its relevance in a student's life.

[www-unix.oit.umass.edu/~resec197](http://www-unix.oit.umass.edu/~resec197)

### Contemporary Internet Communications: Writing, Information Design and Research on the Web - ENGL 297B / ECE 297B (Nelson and Reising)

An experimental course for a non-technical audience, team-taught by faculty members from English and Electrical and Computer Engineering, focusing on the World Wide Web. Issues addressed include: how to conduct academic research on the Web and how to critically evaluate the results; how to design visual information for the Web, including choices in text, graphics and color; and writing about contemporary issues in Information Technology (e.g. security, privacy and ethics) for a non-technical audience. This course is open to all undergraduate students who have completed the Freshman Writing requirement.

### Contemporary Legal and Ethical Issues in Cyberspace - HRTA 394E (Enghagen)

Examines issues in the use of information technologies such as software, the Internet and e-mail. Topics to be covered include: the history of intellectual property law, copyright law, trademark law, online contracting, electronic signatures, taxation, privacy, obscenity, defamation, information security, and cyber crime.

### Digital Re-Presentation - ART 497D/697D (Galvis-Assmus, Lugosch, Schlappi)

Explores communication through visual presentation, allowing the advanced student to develop conceptual skills while mastering production techniques. Each student will analyze concept-based presentations in multiple genres, research and articulate connections between idea and digital representation, master required software, and to develop digital presentations.

### Economic Issues of Contemporary Information Technology (Field)

Analyzes the role that information plays in the economy, and focuses contemporary problems in information production, distribution and consumption that stem from the widespread adoption of new information technologies. Addresses macro and micro implications of IT, and efficiency and equity concerns at local, national, and international levels.



**History of Electronic Media and Information Technology - COMM 234 (Paredes)**

Surveys development of communication and information technologies in a socio-historical framework. Situates the politics and economic imperatives that have driven development, and reviews the visions that policymakers, inventors, and industry had for the future. Examines telegraph, telephone, tv/radio broadcasting, videocassette recorders, satellites, video streaming, history of the Web, tv/Internet convergence, datacasting, information/science technology databases, and digital television. By informing students about technology's historical developments, seeks to motivate them to transform technologies into tools that enhance their own skills and marketability.

**Image Processing, or What's Under the Hood of Photoshop? - CMPSCI 370 (Schultz)**

Focusing on image processing, this class will discover solutions to imaging problems while examining how to create and develop images using MetaFrame, MatLab and IDL. Requires a minimum background in mathematics, other topics to be addressed include video, three-dimensional processing, medical imaging and graphical information systems. Prepares students from all fields for an image-orientated world.

**Information Design - ART 297H (Campos, Giloth, Goldwater, Hosmer, Hudson, Turre, Zinn)**

This is a studio seminar in which the history, nature and method of designing information as a practice of crafting message and meaning are considered. While looking at how people interact with their tactile, visual and verbal environments, students will develop studio, visual thinking, and collaborative skills; necessary tools in the design of the information environment. They will deliberate the nature of information exchange and mis-exchange (The Florida presidential election butterfly ballot is one example), and will have extensive opportunity to build, test, and critique information environments.

[www-unix.oit.umass.edu/~art297h](http://www-unix.oit.umass.edu/~art297h)

**Information Systems in Public Health - (Bigelow and Puleo)**

Provides students experience in the use of selected large scale federal, state, and private databases to answer public health questions. Seeks to cover the spectrum of issues in large database use, from identification and sampling to gaining an appreciation for statistical analysis techniques and the limitations of the data. Intended for seniors, and first or second-year graduate students.

**Information Technology Applications in Public Policy Analysis - PUBP&A 697E (Schweik)**

Seeks to help students in public policy and natural resource conservation to build IT-analytic capacity. The course introduces spatial analysis through use of Geographic Information Systems; and temporal analysis (using dynamic systems modeling software), useful for studying complex systems. Course seeks to build confidence and capacity in applying IT to solving challenging problems in natural resource management and policy analysis.

[www-unix.oit.umass.edu/~pubp697e](http://www-unix.oit.umass.edu/~pubp697e)

**Information Technology in Biology Education - BIOL 5XX (Brewer, Hoagland)**

Provides background and experience to enable students to integrate IT into high school and college biology courses. Students will develop an understanding of IT resources available for teaching biology, and a pedagogical rationale for the integration of IT into biology courses.

**Information Technology in Social and Historical Perspective - JOURN 397T (Israel, Allen, Schlesinger, Paredes, Sims, Huntemann, Watson, Dienes)**

What is the nature of the IT revolution? What changes in culture and society can we attribute to IT, and which are extensions of earlier social and historical forces? A broad, survey readings-and-lectures course exploring IT's social, economic, political, psychological, and cultural effects. Changes to be examined include production of a new culture, an urban social and political revolution, and the Digital Divide.

**Intelligent and Integrated Design Systems - MIE 597O (Terpenny and Woolf)**



Course will introduce and explore the IT techniques and tools of intelligent systems to support engineering design processes. An examination of the theory behind topics and hands-on assignments are included for IT topics such as knowledge: how to identify it, organize it, and reuse it; and integration: of tools, systems, and people (particularly across distances).

#### **Introduction to Business Information Systems - SOM 210 (Sorcinelli)**

Because vast amounts of information are being produced today, one essential is learning and adopting new models for using technology to manage information overload. Course improves students' ability to access, analyze, and synthesize information; distill it into manageable categories; and develop skills to integrate that information in effective business decisions. Students will apply the skills on project-based exercises in a team-oriented laboratory, and develop an understanding of how IT affects actual organizations.

#### **Introduction to Problem Solving with Computers - CMPSCI 121 (Lehnert and Fisher)\***

Provides a rigorous introduction to problem solving by computer using the Java programming language. Open to students in all disciplines and required as the first programming course for computer science majors. By course's end, students should be able to read, write, and use simple Java programs, understand the fundamentals of object-oriented programming, and comprehend the role of high-level languages in computing.

#### **Multimedia Systems - ECE 197H (Burleson)**

Seeks to make computer engineering accessible to a general education audience. It provides hands-on experience in digital audio (MP3 coding), digital video (Internet videoconferencing and DVD production with MPEG coding), and Java-based multimedia collaboration architecture. The laboratories will enable students from non-engineering disciplines to learn about design issues in multimedia computer systems and how they affect users.

<http://www.ecs.umass.edu/ece/vspgroup/burleson/courses/197H/>

#### **Representing, Storing, and Retrieving Information - CMPSCI 145 (Barrington and Verts)**

Surveys ways humans have stored information for processing; kinds of data stored in computers and how they're represented; and issues in retrieving information, including the behavior of search engines on the Web and data formats such as XML intended to simplify the process. Reviews the formal definition of information and its implications for tasks such as data compression. Includes "hands on" with tools for database management -- including principles of design such as the relational model -- and practical advice in their use.

#### **Writing and Emerging Technologies - ENG 391 (Stores and Edwards)**

Examines the impact of emerging technologies in rhetoric, history and culture, and the psychologies of identity. Students will investigate theories by examining the changing workplace, ethics, psychology, collaboration, authorship, ownership, audience, and textual and non-textual forms that affect the making of meaning for both writer and reader. Students will acquire hands-on experience with a range of composing and reading technologies.

[page top](#)

\*not funded by a CITI grant

[Home](#) | [About the Program](#) | [Courses](#) | [For Business Partners](#) | [For Faculty](#) | [For Students](#) | [Contact](#)



Copyright ©2001 University of Massachusetts, Amherst  
Produced and maintained by the Information Technology Program.  
This is an official page of the University of Massachusetts Amherst Campus.

38



# The Information Technology Program

UNIVERSITY OF MASSACHUSETTS AMHERST

[Home](#)[About the IT Program](#)[Courses](#)[For Business Partners](#)[For Faculty](#)[For Students](#)[Contact Us](#)

## About the Information Technology Program

The goal of the program is to enable any interested student to confidently employ IT, and to secure an intellectual platform from which to develop capacity to innovate, using IT in his or her field. At base, the point of the program is to combine the myriad strengths of this great university with the best technical means to extend them, to expand knowledge. By doing so, UMass Amherst seeks (in partnership with the Commonwealth Information Technology Initiative -- CITI -- and with its sister institutions in the University, the state college and university, and community college systems, enrolling some 177,000 students) to mold a knowledge revolution. We believe that revolution will favorably affect the intellectual, social, and economic base of the Commonwealth of Massachusetts.

The IT program includes faculty from across the disciplines, ensuring that UMass addresses the needs of students across the curricula. UMass faculty already apply IT in such disciplines as English, public policy and administration, dispute resolution in legal studies, natural resource conservation, art and art history, and computer-assisted reporting and imaging in journalism. A new, interdisciplinary faculty collaboration in course development and teaching will lead to new research opportunities and funding.

## Background on the IT Program

The UMass Amherst Information Technology Workforce Task Force was formed in 1998 by faculty and staff of the Amherst campus who were members of a President's Office Information Technology Workforce Development Task Force, established to foster linkages between the UMass system and the state's key industries. The UMass Amherst Task Force expanded to include representatives from a number of academic units, including the social sciences, and the humanities and fine arts. At the suggestion of Dean Joseph Goldstein of the College of Engineering, the group took up the subject of IT education at the undergraduate level.

In Fall 1999, UMass Amherst convened a two-day conference and workshop of business, government, and academic leaders to discuss the IT labor shortage. The goal of the conference was to lay the groundwork for a UMass response. See: "[Formulating a UMass Response to the Information Technology Labor Shortage](#)" ( 65 K, requires [Adobe Acrobat Reader](#)).

A short time later, a Curriculum Committee of the IT Task Force formed to sketch out a preliminary IT curriculum for the campus.

On October 13, 2000, some 120 UMass Amherst faculty and staff collected in the Campus Center to focus details of an IT curriculum: who should be involved, what should be taught, what links needed to be formed across the campus in order to move the program forward. The day-long program, sponsored by the Provost, ended with a first request for faculty proposals under the CITI program. In addition, Massachusetts Chancellor of Higher Education Judith Gill told workshop attendees that her office would ask renewed state funding for another round of grants. By Spring 2001, 20 courses had been developed.

One highlight of the October 2000 workshop was a keynote address by [Dr. Cheryl Harris](#), a UMass alum active in the high-tech sector. While IT programs in institutions around the country have begun with technical roots, Dr. Harris argued that the future of IT requires an even broader approach -- one consistent with the breadth, traditions, and culture of UMass Amherst.

## UMass IT Steering Committee

W. Richards Adrion  
Professor, Department of Computer Science

39

**Kevin Aiken**

Director, Division of Continuing Education

**David Mix Barrington**

Associate Professor, Department of Computer Science

**Steven Brewer**

Assistant Professor, Department of Biology

**Wayne Burleson**

Associate Professor, Department of Electrical and Computer Engineering

**Glenn Caffery**

Director, Statistical Lab, Department of Resource Economics

**Marc Cohen**

Director, Computer Operations and Support, Office of Information Technologies

**Leda Cooks**

Associate Professor, Department of Communication

**Seshu Desu**

Professor and Head, Department of Electrical and Computer Engineering

**Barry Field**

Professor, Department of Resource Economics

**Graham Gal**

Associate Professor, Isenberg School of Management

**Copper Giloth**

Director, Academic Computing, Office of Information Technologies

Associate Professor, Art Department

**Joseph Goldstein**

Dean, College of Engineering

**Karen Hayes**

Strategic Technology Alliances, Director of Corporate Outreach

**Bill Israel**

Assistant Professor, Journalism Department

**James Kurose**

Professor and Chair, Department of Computer Science

**Robert Moll**

Associate Professor, Department of Computer Science

**Charles Moran**

Professor, Department of English

**Maribel Castaneda Paredes**

Assistant Professor, Department of Communication

**Brenda Philips**

Executive Director, Commonwealth Information Technology Initiative

**Richard Rodgers**

Strategic Technology Alliances, Director of Corporate Relations

**Carolyn Sanzone**

40

Assistant Vice Chancellor, Strategic Technology Alliances

**Charles Schweik**

Assistant Research Professor, Department of Resource Economics  
and Center for Public Policy and Administration

**Joan Stoia**

Director, Campus Career Network

[Home](#) | [About the Program](#) | [Courses](#) | [For Business Partners](#) | [For Faculty](#) | [For Students](#) | [Contact](#)



Copyright ©2001 University of Massachusetts, Amherst  
Produced and maintained by the Information Technology Program.  
This is an official page of the University of Massachusetts Amherst Campus.



# The Information Technology Program

UNIVERSITY OF MASSACHUSETTS AMHERST

[Home](#)[About the IT Program](#)[Courses](#)[For Business Partners](#)[For Faculty](#)[For Students](#)[Contact Us](#)[IT Program Home](#) > [News Archives](#)

## News Archives

### CITI Administrative Director Appointed

Dec. 4, 2000

Brenda Philips has been appointed to fill the position of administrative director for the Commonwealth Information Technology Initiative (CITI). Cora Marrett, provost and vice chancellor for academic affairs, announced the appointment. Philips began work November 15.

The Commonwealth Information Technology Initiative is a comprehensive program to address the information technology industry's needs for an educated workforce. This initiative is housed at UMass Amherst and has been funded by the Board of Higher Education at \$1.7 million for the first year of the three-year initiative. The goal of the CITI is to enhance and strengthen the academic information technology programs in all of public higher education (the 29 community colleges, state colleges and universities) in the state.

Philips comes to UMass with more than seven years of experience in creating and managing complex education programs. Among her activities, she was director of the Lemelson National Program at Hampshire College. She helped establish and manage Hampshire College's \$4.5 million innovation and entrepreneurship program. In addition, she helped create the National Collegiate Inventors and Innovators Alliance, an organization that disseminates the teaching of innovation and entrepreneurship to schools nationwide.

In her most recent position, she was executive director of EntreNetwork where she created a new consortium that develops high-impact, collaborative programs promoting entrepreneurship in Western Massachusetts. The consortium sponsored the recent conference "The Internet Economy Comes to Main Street" which was opened by Governor Cellucci, and featured many national speakers. She also created the award winning website [entrenetwork.com](http://entrenetwork.com). She has a BA and MBA from Yale University.

In addition to working with Marrett, who is also the principal investigator of CITI, Philips will work closely with Drs. Jim Kurose (department head of Computer Science) and Joe Goldstein (dean of Engineering), co-investigators of CITI.

### Significant Funding for New Program

November, 2000 - The Massachusetts Board of Higher Education (BHE) has awarded \$1.68 million to develop a comprehensive program to expand IT-related course offerings in all academic disciplines; enhance faculty skills and modernize curriculum in computer science, computer engineering, and information technology; and promote collaboration in the IT area across the Commonwealth's three systems of public higher education. The program is named "Commonwealth Information Technology Initiative" (CITI).

[Download PDF file of CITI Initiative](#)  
( 65 K, requires [Adobe Acrobat Reader](#))

### All-Campus IT Workshop: Developing an Information Technology Curriculum

On October 13, 2000, over 110 faculty and administrators from the UMass Amherst campus participated in an interdisciplinary workshop to help define components of a new IT minor. During break-out sessions, participants sought to identify a common set of courses that might be offered



as an IT minor across all academic disciplines. The workshop concluded with discussion of a request for new course proposals, to be funded by the CITI grant, to flesh out elements of the new minor. The program:

8am Registration

8:30 Welcome and workshop goals (Auditorium) Bill Israel, Department of Journalism

8:35 Introduction (Provost Marrett)

8:50 Two perspectives A View From the Field: An Alumni Perspective (20 minutes) (Cheryl Harris, Chief Experience Officer, OMNIENT) A Faculty Perspective (10 minutes) (Charlie Schweik, Department of Resource Economics and Center for Public Policy and Administration)

9:20 Summary of last year's workshop (Joe Goldstein, Dean of Engineering) Overview of the System-wide BHE/CPIP Grant (Jim Kurose, Chair, Computer Science)

9:50 The initial IT curriculum Overview on IT steering committee work (Les Ball, Assoc. Dean, School of Management) Initial minor design and an overview on core courses (Seshu Desu, Head, Dept. of Electrical and Computer Engineering)

10:05 Coffee break and brainstorming (8th floor)

10:15 Breakout sessions - How would the IT minor work in my College/School or Department? Breakout sessions will occur in several meeting rooms on the 8th floor of the Campus Center. Participants will find their designated breakout room assignments on the "Breakout Group" handout given at registration.

12:00 Lunch (Amherst Room, 1009)

12:30 Lunch speaker: Chancellor Judith Gill, Board of Higher Education

1:00 Report back and discussion (Auditorium) 2:00 Introduction to the local request for proposal process (Provost Marrett)

2:05 Presentation: Course proposal guidelines (Seshu Desu) RFP process: (Criteria for evaluation, How \$ will be allocated, Timeline, Contact person or persons for questions) Question and answer

3:00 Concluding comments (Provost Marrett)

### **Workshop Keynote Address by Dr. Cheryl Harris**

The topics that have been addressed so far today are ones to which I've also given a lot of thought over the past several years, as I've interviewed and hired literally dozens of new and recent graduates to work with me at several different internet companies in NYC and California. I've also spent a great deal of time investigating emerging programs in IT, e-business, new media, etc, at universities across the country in the hope of finding a single source for promising new hires, and have been consistently disappointed. There just doesn't seem to be - yet - a higher education curriculum that takes into account the disciplinary overlaps and shifts of the last several years. So, I've definitely fantasized about my "ideal information worker" and jumped at the chance to talk about that with you. However, I'm not saying that there is an expectation that colleges and universities operate as vocational schools. I feel very strongly that the most important criteria for success in this or any industry is the ability to think critically and effectively.

First, a couple of disclaimers, in the interest of fairness.

My perspective is anecdotal, based on my own experiences running internet companies and talking to colleagues in similar positions around the country. Also, the internet business isn't yet a culture receptive to research, which is one of the things I want to talk about today, so lots of facts and figures on its employees and general context are lacking.



Second, I'm afraid my futuristic visionary muscles may have atrophied a bit while working in an industry that rarely looks ahead or behind more than 12 or 18 months. I realize that universities need a far greater range of motion than that, but I hope I can shed some light, at least directionally, on likely trends.

Having said all that, I have to admit that I strongly believe that the way in which universities are traditionally organized is a hindrance to their ability to step up to the challenge of the "information worker" era. Particularly, I think an embedded assumption of the industrial age is that education (and learning) terminates with the award of a degree. Industrial age workers with equipped with most of what they needed to know at the beginning of their careers, and the world held still long enough not to challenge that too much.

Now, of course, that assumption is a dreadful error. Organizing around that thought led to the idea that deep preparation in single subject - "the major" - within a immersive, temporary learning environment was the best response, and it was, in former times. These concepts are smashed to bits now, but universities cannot easily mobilize around what I think are the two most pressing needs:

1. Learning that is lifelong
2. Profoundly inter - and cross-disciplinary training

Since arguably every new graduate is destined to "knowledge work" for their lifetime, these would be the greatest gifts that we could bestow - the ability to move fluidly between many interrelated disciplines and ideas, and a taste for continued learning and growth.

Yes, I'm saying that departments and majors in their present form are anachronistic. As a former academic myself, and hopefully I will return to teaching one day soon, I know that's subversive, even blasphemous, but please bear with me a few moments and I'll explain how I came to that conclusion. It was the result of some painful personal lessons and observations:

"Knowledge Companies" (or in my perspective e-business concerns) have experimented with two different work models. One is notably more successful than the other. The first is assembly-line, functionally organized, 'throw it over the wall' production. This is more of an industrial age model. The second requires fluid teams which form around projects or goals, and which are highly collaborative and iterative, and in which functional boundaries are thrown out. The impression is more of a 'swarm of brainpower' brought to bear simultaneously on a problem. The model is closer to the notion of a distributed computing model where linked machines set to work on a problem are exponentially more powerful than a series of sequential units.

This second model works much more effectively and efficiently but it is very difficult to teach this method to people because our educational experiences do not generally reward this kind of behavior. In schools and universities, students are rewarded for working alone and for individual achievement, not group achievement, and for solving problems in a linear fashion. The second model also only works if all members are effectively cross-trained. Cross-training is foiled by the immersive "major course of study" emphasis of traditional universities. Students generally have little more than superficial exposure to disciplines outside their major coursework, and within the major courses there usually is not a lot of emphasis on making connections to concepts that might be related within other disciplines.

I love to teach, but overcoming those two challenges in a fast moving business are daunting. I have to winnow out people who are intolerant of the new way of working and learning, simply because there is so little time to re-train on the job.

The loosely defined functions in internet companies sound new but they are aggregates of disciplines that should have corollaries in existing university curricula, but currently do not. Internet companies divide along two lines, in general, and both camps must have intimate knowledge and appreciation of the other.

These are:

USER EXPERIENCE



## TECHNOLOGY (Includes: Information Architecture Design Marketing)

STRATEGY Strategy shifts constantly seek to align the two general functions.

Technology requires great conceptual thinkers, because retooling is constant, so flexibility in thinking and learning is a must.

User Experience is the "holy grail" and leads all efforts - it is what internet users see, perceive and experience - but it is a challenge because, providing just one example, user experience has to do with everything that contributes to optimizing interaction between technology and people. To do it well, realistically a person needs to know media theory (how images are "read"), research methods (to know how to match people's needs to solutions in a rigorous way), cognitive psychology, social psychology, art and design theory, taxonomy principles (such as those taught in library and information sciences), how the brain works, and what is known about human factors, usability, and interface design from decades of previous technological development. This brief list of desirable skills and knowledge pretty much crosses all the disciplinary boundaries of a university, and of course, it is unlikely that a student would have deep preparation in more than one or two of these. That is one of the reasons so much internet design/development is disjointed, difficult, and problematic at present.

Furthermore, effective strategic planning, so important in forward-looking technology fields, is produced only by good critical thinkers, MBA's or no, who can link or synthesize diverse paradigms, and who know the historical context of what they're looking at, and who are not constantly re-inventing the wheel just because they can.

So, for me, the ideal world would be a truly cross-disciplinary program that produced a paragon with all these virtues. I joked with Glenn Gordon when he first mentioned this initiative to me that I would certainly hire every one of these paragons that your future program could produce, but I'm afraid I would have to get in line with a lot of my colleagues if you succeed in developing a program even close to the one I described. I truly look forward to participating in this effort with you, and to our further discussion today. Thank you.

## Preliminary Report from the IT Task Force Curriculum Committee

Spring 2000

Members of the Committee: Seshu B. Desu, Dave Barrington, Charlie Schweik, Graham Gal, and Harlan Sturm

The committee focused on developing core curriculum for a minor in information technology (IT). The emphasis for the core curriculum was such that any student irrespective of their background should be able to take these courses and be able to get a minor. Although a minor only requires only five (3-unit) courses, the committee decided to develop several courses in order to provide choices for students with different interests.

The list of courses the committee decided on are:

### 1) Introduction to Information Technology

The objective of this course will include: teaching students the concepts of modern computer information systems with an emphasis on the key concept of information; teaching the rudiments of modern electronic technology. This course will also prepare the students technically so that they can succeed in other IT courses. Several faculty members from different departments may be involved in developing this course. Computer Science Department currently offers couple general courses. These courses may be used as a basis for developing this course.

### 2) Principles of Object Oriented Programming

The course will provide students with the necessary background in object-oriented design and programming. The students will be exposed to object oriented design strategies and language features & constructs that support the object environment. Upon completion of the course, students will be able to apply system development principles using an object-oriented language,



show how object-oriented techniques increase productivity of complex systems. This course will be jointly developed by both CS and ECE departments.

### 3) Representing, Storing and Retrieving Information

This course will provide an introduction to the representation, storage, retrieval, manipulation, analysis and display of information. This course includes an introduction to data structures, design principles of databases, database models and database management systems, architectures, database analysis and design, and database administration. Topics such as heterogeneous collection of data and effectiveness of various search engines will also be included. Prof. Barrington (CS) is taking the lead in developing this course, which will be available for Fall-00. CS will be underwriting the development cost.

### 4) Introduction to Internet Technology

The objective of the course is to develop a familiarity with the concepts, vocabulary and tools of internet technology as well as enhance students' written and oral presentation skills. Prof. Ganz (ECE) is currently developing this course and will be offered in Fall-00. ECE is underwriting the development cost.

### 5) Multimedia Systems

This course introduces students to the systems issues in multimedia, providing a unified view of the way that multimedia applications are implemented as well as specific details on the design of various multimedia system components. Students will use various web-based tools to learn the various engineering issues in multimedia (e.g. network performance, compression algorithms, errors). The course will present simple intuitive explanations of multimedia systems, avoiding the advanced mathematics required for a thorough understanding, but providing sufficient depth to understand the multimedia issues in larger IT systems. Prof. Burleson (ECE) is currently developing this course and will be offered in Fall-00. ECE is underwriting the development cost.

### 6) Political and Social Impact of Information Technology

This course discusses issues such as free speech versus censorship, privacy, ethics, intellectual property, cybercrimes versus security, liability, safety and electronic government. Prof. Schweik (Pub. Pol) is looking into developing this course. However, we need to find financial support for developing this course.

### 7) The Political Economy of Information Technology

The course deals with the various political and economic theories related to IT. Issues such as information transport, information content, information markets, electronic markets, government intervention, electronic communities and changing urban economies. In addition to examining the macro indicators and trends, the course will also examine the microeconomics and politics of specific arenas such as software industry, telemedicine. Currently, we neither identified leaders nor found funding for developing this course.

8) Management of Information Technology in Organizations This course deals with the issues of information technology management in public and nonprofit organization. Topics include, information management concepts, organizational applications and issues, and strategic planning of IT. Prof. Gal (SOM) will be looking into developing this course.

The courses 3, 4 and 5 are being developed currently and will be offered in Fall-00 for honor students as a pilot. The detailed course descriptions are attached for each of these courses. Honors College may be able to pay \$5,250 per course, which will cover part of the cost of instructor expense for teaching the course.

Enclosures:

1) Sample layout of Courses leading to a Bachelor of Science degree in Information Technology from RPI.

2) List courses offered by the School of Information Science and Technology of Penn. State

## MEMORANDUM

**TO:** Prof. Bill Israel, Director, UMass IT Initiative

**FROM:** Joan Stoia, Director, Campus Career Network

**SUBJECT:** Material for the IT Minor/IT Program Value Proposition  
Submitted on Behalf of the Campus Career Network

**DATE:** August 17, 2001

Here is a brief overview of last year's industrial recruiting activity, information on desired skills and future hiring trends for the "Value Proposition" you are developing in connection with the UMass IT Program.

### **UMassAmherst Employer Relationships**

Employers have always held the University of Massachusetts Amherst in high esteem. In fact, many of the recruiting relationships in existence today date back forty years or more. In the 1980's the campus redoubled its efforts to cultivate prestigious local, regional and national firms with good result, especially in the technology arena. Because of the campus' reputation for excellence in engineering, science and technology, our annual campus interview schedule reads like a "Who's Who" of American industry—Arthur Andersen, Cisco, General Electric, IBM, Nortel Networks, Pfizer and United Technologies.

During 2000-2001, representatives of over 400\* firms visited campus under the auspices of one or more of the Campus Career Network's recruiting and pre-employment programs. While the list is varied, there exists a heavy emphasis on recruiting by scientific, engineering and information technology firms. A partial list is attached. In addition last year, over 900 organizations actively recruited students for co-ops and interns, and over 1,000 students completed University-sponsored co-op and internship placements. Many of these were with either users or producers of information technology, for example, AT&T Broadband of New England, Channelwave Software, Compaq Computer, EMC2, Fidelity Investments, GENUITY, Honeywell, Intel, Lucent Technologies, MassMutual, Raytheon, and Storage Networks. Finally, a growing number of firms chose to recruit new graduates and experienced alumni electronically, via the Career Network's new website (these numbers are not yet available).

The dramatic increase in the demand for college graduates which began in the 1980's and the staggering technological advances of the last decade have combined to create a much more dynamic set of industry/University partnerships than existed in the past. The strong base of support we currently enjoy among the region's technology companies and the

---

\* (does not include additional recruiting through the Isenberg School of Management and other academic departments)



continuing demand from all sectors of the economy for more technically-trained workers make this a particularly good time for the University to increase both the number and range of IT-related courses for our students.

### **Necessary Skills**

Staff and faculty involved in the UMass Amherst Information Technology initiative continually gather data from employers and industry groups on the skills they see as critical for success in the new economy. Among the employers who recruited our engineering and computer science graduates last year, the most commonly preferred qualifications were knowledge of C/C++, Visual Basic, Unix, HTML, Java, and Windows NT. Other popular skill areas included experience with Oracle, PL/SQ, PERL, TCP/IP, Sun OS, and the Windows Operating System.

According to a recent article in *Computerworld* magazine, employers want people who are familiar with storage technologies, networking and network management, optical networking and wireless technologies. Students from every discipline can benefit from a familiarity with new technologies dealing with internet security, the speed and reliability of data transmission and wireless communication. These technologies are ubiquitous, impacting our daily lives through e-tailing, online bill paying, portfolio management and other commercial activities that must occur in "real time."<sup>1</sup> Employers from financial services, retail and consulting firms tell us they will entertain applications from liberal arts disciplines so long as they can demonstrate mastery of spreadsheet, word processing and database applications at the intermediate level or better. While spending for corporate training programs soared to over \$60 billion during the 1990's, today's employers find in-house training expensive. They expect their new college hires to come "bundled" with more of the skills they will need on the job. A year ago, companies that were growing exponentially placed a high premium on, and paid high premiums for, advanced technical skills. Industry analysts predict a resurgence in the importance of soft skills, such as interpersonal communication and project management, as the number of candidates surpasses available jobs.

### **Demand for New Graduates**

While our Class of 2001 surveys are only just beginning to come in, we are reasonably certain that many of our business and technical graduates obtained their jobs well before the recent downturn. It is too soon to know precisely how many offers were rescinded, however, and how many new hires have fallen victim to summer layoffs.

Despite cyclical adjustments in high tech manufacturing and telecommunications, and the failure of many e-businesses to catch on, there is little doubt that technology industries will continue to dominate the Massachusetts economy. Recent stories on NPR and in the trade publications point to traditional, "bread and butter" companies as sources of technology employment. Companies such as Home Depot, Avon, Target and

---

<sup>1</sup> Brandel, Mary. "Getting an Edge," *Computerworld*, June 4, 2001

FleetBoston, which invested heavily in existing infrastructure rather than go "dot.com" are a good bet for job seekers this year.<sup>2</sup>

According to Northeastern University economist Paul Harrington, who monitors technology employment for several Massachusetts industry groups, high technology manufacturing employment will be down this year, as will the number of opportunities in high tech services. However, Harrington predicts that even though hiring activity will slow, the impact will be felt more in senior level and managerial categories than among new college grads. Surprisingly, early survey returns indicate an increase in vacancies among engineering and architectural services firms (as great as 7% for civil engineers), as well as in research and testing firms and scientific instrumentation companies. Workers with advanced degrees in the biological and physical sciences and in mathematics will continue to be in demand, he says.

Other analysts predict the end of lucrative signing contracts and other perquisites for high tech workers, as well as a return to more selectivity in hiring processes.

If we can provide you with additional data or information on recent recruiting activities or IT hiring trends, please do not hesitate to call.

Attachment: Selected Recruiting Organizations, 2000-2001

---

<sup>2</sup> Resende, Patricia. "Net Gains: Best Place to Work in IT? Surprise!," *Mass High Tech*, August 16, 2001.



## **Selected Co-op Recruiters, 2000-2001**

Arkwright  
Axcelis Technologies  
Bayer  
Biogen  
Chubb  
Compaq Computer  
Federal Reserve Bank of Boston  
Fidelity Investments  
Filene's/The May Co.  
General Dynamics Defense Systems  
General Electric Co.  
GlaxoSmithKline  
Mead Corporation  
IBM  
Instrumentation Laboratory  
iPhase Technologies  
IT Group  
Kaman Aerospace  
MA/COM  
Travelers Insurance  
Cambridge Computer Services Inc.  
Applied PC Systems  
CIGNA  
Enterprise Rent-A-Car  
Intel Corp.  
Ortho-McNeil Pharmaceutical  
OSCO Drug/Sav-on Drugs/Albertsons  
SeaChange International Inc.  
United Technologies Corp.  
JC Penney  
Wal-Mart  
PricewaterhouseCoopers  
Ernst & Young  
MassMutual  
Arthur Andersen  
Deloitte & Touche  
EMC2  
Toys R Us  
KPMG LLC  
SeaChange International Inc.  
Sun Life Financial  
Sherwin-Williams Co. (The)  
Dyax Corp.  
PTC (formerly Parametric Technology)

**Selected On-Campus Recruiting Organizations, 2000-2001**

Abercrombie & Fitch Co.  
Acosta Sales & Marketing Inc.  
Aetna  
Agilent Technology  
AIC (Automotive Information Center)  
Akibia (formerly Polaris Solutions)  
Alan Dick & Co.  
Alstom Power (formerly ABB Combustion)  
American Express  
Ames Department Stores  
Amica Mutual Insurance Co.  
Analog Devices  
Andersen Consulting (now Accenture)  
Applied PC Systems  
Arthur Andersen  
Aspen Square Management  
Avery Dennison  
Avici Systems  
Aware Inc.  
BAE Systems  
Berry Insurance  
Black & Decker  
Blooms CBS  
BMC Software  
Boeing Satellite Systems  
Bright Horizons Family Solutions  
Cambridge Computer Services Inc.  
Camp Dresser & McKee Inc.  
Carter-Wallace  
Casual Corner Group  
CIGNA  
Cisco Systems  
Clearwire Technologies, Inc.  
Compaq Computer Corp.  
Computer Sciences Corp.  
Conexant Systems Inc.  
Crate & Barrel  
DataViz  
Devereux Foundation (The)  
EF Education  
EMC2  
Empirix Inc.  
Energizer Inc.  
ENSR Consulting & Engineering  
Enterprise Rent-A-Car  
Equis  
Farm Credit Agricultural Credit Association  
Ferguson Enterprises Inc.  
Fidelity Investments  
Filene's/The May Co.  
Filtronic Comtek



First Investors Corp.  
Fleet Boston Financial  
Foxboro Company  
Gap Inc.  
GE Financial Assurance  
General Dynamics Defense Systems  
General Electric Co.  
General Electric Co.  
GENUITY (formerly GTE Internet Working)  
Gillette Co.  
Globix Corp.  
Green Corps  
Harvard Medical School  
Hertz Corp.  
IBM  
Industrial Economics  
Intel Corp.  
Internal Revenue Service  
J. Baker Inc.  
Jarvis Airfoil  
JC Penney  
Judith Nitsch Engineering, Inc.  
Key Program Inc. (The)  
Kiewit Construction Co.  
Kraft Foods Inc.  
Lexra Computing Engines  
Liberty Mutual Insurance Co.  
Lockheed Martin  
Los Angeles (County of)  
LTX Inc.  
Lynx  
MA (Commonwealth of)  
MA-COM Inc.  
Massachusetts Police Corps  
MassMutual  
MathWorks Inc. (The)  
May Institute (The)  
Metlife  
MFS Investment Management  
Microchip Technology  
Microsoft Corp.  
Microwave Data Systems  
MIT Lincoln Laboratory  
Mitre Corp. (The)  
Modern Continental Construction Co.  
National Student Campaign Against Hunger  
Netegrity  
New England Ctr. for Children (The)  
New England Financial  
New York Life Insurance Co.  
Newell Rubbermaid  
Northrop Grumman Norden Systems  
Northwestern Mutual Financial Network

OfficeMax  
One Stop Business Centers Inc.  
Onsite Companies  
OPENWAVE Systems Inc. (formerly Software.com)  
OSCO Drug/Sav-on Drugs/Albertson's  
PC Connection Inc.  
Pennington Lawn & Garden  
Pepperidge Farm  
Pfizer Inc.  
Phoenix Life Insurance Co.  
Polaroid Corp.  
Precision Connector Designs (PCD)  
PricewaterhouseCoopers  
Primix Solutions Inc.  
Procter & Gamble  
Progressive Campaigns Inc.  
PTC (formerly Parametric Technology)  
Public Interest Research Group (PIRG)  
Putnam Investments  
QesTec Inc.  
Quantum Corp.  
Raytheon  
Readak Educational Services  
RSA Security Inc.  
Saint-Gobain Abrasives (formerly Norton Co.)  
Salomon Smith Barney  
Sanders/A Lockheed Martin Corp.  
Sanmina  
Sapient Corp.  
Scientific Placement, Inc.  
SeaChange International Inc.  
Sears Roebuck & Co.  
Sequence Design Inc.  
Shawmut Design & Construction  
Sherwin-Williams Co. (The)  
Simplex Time Recorder Co.  
SMC Corporation of America  
Sodexo Marriott Services  
Spring Tide Networks  
SQMsoft  
Staples Inc.  
StorageNetworks  
Sun Life Financial  
Sybase Inc.  
Tallan, a CMGI Co. (formerly CMGI Solutions)  
Telaxis (formerly Millitech)  
Telica  
Teradyne Inc.  
TJX Companies  
Toray Plastics  
Toys R Us  
Tra-Con Inc.  
Travelers Property Casualty Corp.



TriTek Solutions  
TSR Wireless  
TTI Inc.  
United Lens Company Inc.  
United Technologies Corp.  
University Sports Publications  
US Dept. of Energy  
Verizon Comm (formerly Bell Atlantic/GTE)  
W.B. Mason Inc.  
Wal-Mart  
Washington Group (The)  
Wells Fargo Financial (formerly Norwest Fin)  
Wolf, Greenfield & Sacks, PC  
Wyman Gordon Co.  
xo Communications (formerly Nextlink)  
Y.O.U. Inc. Alternative Sentencing Project  
York International