Information Technology Education
IT Across the Curriculum

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outline

- who, what, when, where, how, why
- current program
- new directions

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the short answer

- who? where?
  - initially, umass amherst, then the 28-campus state system of higher education
- what?
  - initially, an "IT program," then "IT across the curriculum"
- when?
  - initially, 1998 and continuing
- how?
  - initially, "volunteers," then Commonwealth Information Technology Initiative (CITI)
- why?
  - initially, regional workforce demands

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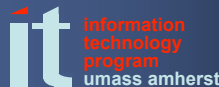## who? where? when? why? what?

- initially -- umass amherst information technology workforce task force (ITTF)

    when: formed in 1998

    who: by faculty and staff of the university of massachusetts amherst campus; were members of a umass president's office information technology workforce development task force; expanded to include representatives from a number of academic units, including the social sciences, and the humanities and fine arts

    why: established to foster linkages between the umass system and the state's key industries

    what: IT education at the undergraduate level

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who? where? when? why? what?

- in parallel -- "Review of Computer and Information Science/Technology (CIST) Programs for the Massachusetts Board of Higher Education,"
  - **when:** 1998-1999
  - **who:** by an external committee
  - **why:** decadanal review of programs
  - **what:** "make a commitment to the continuous improvement of the quality and responsiveness of the CIST programs in the public higher education system in order to promote the future economic development of the Commonwealth …. Now!"

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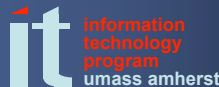**july 12, 2004**

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- 1999
  - convened a two-day conference and workshop of business, government, and academic leaders to discuss the IT labor shortage to lay the groundwork for a umass amherst response
    - see "Formulating a UMass Response to the Information Technology Labor Shortage"
      http://www.umass.edu/itprogram/ITworkforce.pdf
  - formed a curriculum committee to sketch out a preliminary IT curriculum for the campus.
- 2000
  - 120 umass amherst faculty and staff gathered 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
    - **led to IT across the curriculum focus**

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voices heard

- "[all] students should have the opportunity to **IT literate** … others should have the opportunity to become majors, to become **'IT competent'** … but many, many more students should become **'IT fluent'** " -- National Research Council report
- "while IT programs in institutions around the country have begun with technical roots, the future of IT requires an even broader approach -- one consistent with the breadth, traditions, and culture of UMass Amherst … include **more human dimensions** - - Cheryl Harris, in her keynote,
- "[an IT program must include] **social, psychological, political, economic and cultural effects** of information technology" -- umass amherst faculty
- "… the transformation is to IT as a **'whole view'** …'" -- industry analysts

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challenges

- economic challenges:
  - high demand, limited resources
  - the demand for graduates and for knowledge is **not only broad, but deep**
  - educational budgets are increasingly limited
  - limits to faculty and expertise
- structural challenge:
  - higher education advances knowledge by creating disciplinary specialists educated, vetted, and rewarded by other disciplinary specialists
  - in contrast, the central imperative in IT education seems less to improve on disciplinary specialties than to **bridge** them.

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who? where? when? why? what?

- Commonwealth Information Technology Initiative (CITI)
  - **when:** 2000 --
  - **who:** Massachusetts BHE
  - **why:** to upgrade IT curriculum, improve professional development opportunities, and encourage regional collaboration among community colleges, state colleges and the umass system -- to address issues in BHE report
  - **what:** request for faculty proposals:
    - conceived as a $7M initiative, CITI and other sources provided $2M (reduced due to budget difficulties) to improve research and teaching
    - by Spring 2001, 20 courses had been developed with CITI funding (55 total, now well over 60 in place; 170 system wide)
    - renewed for AY04-05 at $1M
    - a major focus of CITI is **"Information Technology Across the Curriculum (ITAC)"** – an innovative program that will better prepare Massachusetts workers for jobs in both IT and non-IT companies

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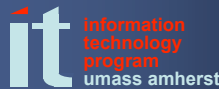umass amherst

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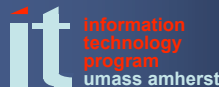
in short… our IT program addresses

- IT as a field is exceedingly broad, interdisciplinary, dynamic, and integrative
- its breadth, the velocity of change in the field, and the outlook for continued growth require that an IT curriculum, similarly, be very broad, connected to technical roots, and accessible through the aspirations of the user
- strongest opportunity:
  - **leverage the IT abilities of our current faculty across the curriculum**
  - produce graduates who are IT fluent

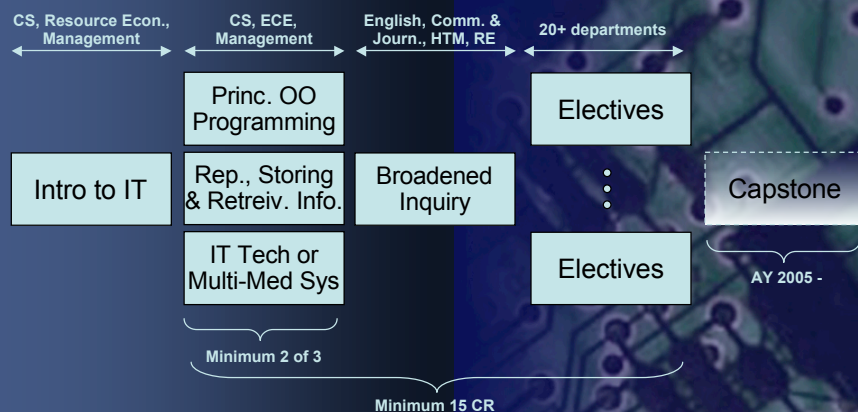**information technology program**
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IT minor

- supported by the whole campus without a traditional home (college, department)
- enable any student to:
  - reach a comfort level with (fluency in) information technology in the context of her/his major
  - acquire a platform from which to innovate in any field
- companion programs at UMASS Boston, Worcester State College, Salem State College, and Bristol Community College

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requirements

CS, Resource Econ., Management	CS, ECE, Management	English, Comm. & Journ., HTM, RE	20+ departments

Princ. OO Programming

Intro to IT

Rep., Storing & Retreiv. Info.

Broadened Inquiry

IT Tech or Multi-Med Sys

Electives

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Capstone

Electives

AY 2005 -

Minimum 2 of 3
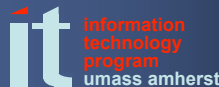
Minimum 15 CR

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electives

- Art297H - Information Design
- MIE 597O - Intelligent and Integrated Design Systems
- Bio597F - Information Technology in Biology Education
- Educ390R - Finding, Using and Evaluating Information Electronically
- BIOEPI 690F- Information Systems in Public Health
- Acctg311 - Business Applications of Computers
- Acctg397B - E-Business
- Art271 - Introduction to Computing in Fine Arts
- Art372 - Introduction to Computer aided design in Arts
- Art374 - Computer Animation I
- Art397J - Computer Animation Ii
- Art397Z - Computer-aided Graphic Design
- Biol597: Special Topics: Genomics and bioinformatics
- Biol597 Special Topics: Sex Steroids - Advanced Physiology: Communicating Current Research in Endocrine Physiology
- Biol572 Neurobiology
- BMATWT 452 - Building Materials Computing and Telecommunications
- CompLit236 - Digital Culture I

- CmpSci 370 - Image Processing
- CmpSci 551 - 3-D Animation and Digital Editing
- CmpSci 552 - Interactive Multimedia Production
- English 391C - Advanced Software
- FOMGT304 - Information Technology in Finance
- Forestry/WFCON577 - Ecosystem Modeling and Simulation
- Forestry/WFCON587 - Introduction to Digital Remote Sensing
- Forestry/WFCON592G - Geographic Information Systems
- Journ 391R - Travel Writing and Photojournalism
- Journ 392M - Wired Reporting
- Journ 392R - Future of Online Journalism
- Journ 393C - Computer-Assisted Reporting
- Journ 397P - Introduction to Digital Photography
- Journ 397W - Introduction to Web Journalism
- MKTG 491B - Direct Marketing
- MKGT 491D - Introduction to E-Commerce
- Music585 - Fundamentals of Electronic Music
- Music586 - MIDI Studio Techniques
- NRC290S - Introduction to Spatial Information Technologies
- SOM 597G - Internet Business Design

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UMass Amherst IT Minors say:

Students in Policy Analysis at the Center for Public Policy & Administration

- achieving a "comfort level"
- achieved some of the "platform to innovate" in their fields
- medium to very high satisfaction
- at least a third said they wanted more technical courses

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Quotes for this year's grads …

- really want to get into business side of technology maybe continue IT in grad school
- I just got off the phone with the folks at Liberty Mutual - I got the job! The title is Associate Software Engineer, and I start in June
- [interested in]   software documentation … it's so creative; not as dry as most people would think … creativity is in the designing.
- … particularly interested in web development
- … interested in TV production, and [IT is] so huge in that
- assisting … new media marketing director of Blue Note, Angel and Manhattan recordings -- a division of EMI, Inc. …coordinate deals with other I-net web sites
- … plan to go to grad school for MBA, perhaps technical MBA
- will work in online journalism, combining journalism and IT
- [job as] assistant manager in IT track at Marriot in Washington D.C.
- … got a technical writing job because of the IT Minor … the interviewer read about the IT Minor courses and was floored
- will combine IT with Bio- and Molecular-chemistry … will complete M.S. in Biochemistry next year

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issues

- recruitment
  - 50 – 55 new IT Minors/year $\Rightarrow$ **100 with the help of CITI**
  - materials and the new website — including profiles of courses, faculty, alumni, and businesses — will be online
  - **particular emphasis will be placed on reaching women and students from disciplines not currently well represented**
- retention
  - difficult for students to find room in their schedules
  - infrequent course offering
- diversity
  - CITI programs have been successful in recruiting female students and students of color
  - suggests the **inherently broad appeal of interdisciplinary IT**

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diversity

- 42% of students in the UMass Amherst IT Minor are female
- students of color enroll at almost twice their representation on campus
- African-American and Latino students enroll in the IT minor at higher rates than their representation in the general campus population.!
- CITI II will examine factors and remaining barriers to success in recruitment of female and underrepresented minority students
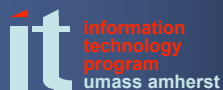
Undergraduate Enrollment Percentages by Race of Students Who Reported Race (March '04)		
Race/Ethnicity	Campus	IT Minor
Amer. Indian/Alask. Nat.	0%	0%
Asian/Pacific Islander	8%	19%
Black/African American	4%	7%
Cape Verdean	1%	0%
Hispanic/Latino	4%	5%
ALANA total	17%	31%
White, Non-Hispanic	83%	69%
Total	100%	100%

Undergraduate Enrollment Percentages by Gender of Students Whose Gender Is Known by Us		
Gender	Campus	IT Minor
Female	50%	42%
Male	50%	58%
Total	100%	100%

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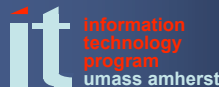cra snowbird '04
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issues

- assessment
  - demographic data on enrollees, transcripts of students upon entry and completion of the IT Minor, and exit interview notes
  - broader CITI assessment effort over the next 15 months
- development
  - base funds from all 9 UMass schools and colleges
  - new CITI funding (with industrial match)
  - IBM

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new directions:

- curriculum
  - increasing course availability
  - five colleges (amherst, hampshire, mount holyoke, smith, umass amherst) courses, minor
  - capstone course
  - seminar requirement based on IT lecture series?
- infrastructure
  - learning commons -- a gathering place in the umass amherst library with wireless connectivity, workstations, social structures and events

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other programs

- IT Major
  - high demand -- students now craft an IT Major through the BDIC program
  - first step, however, is to **clearly define what an IT major is on our campus**
- IT Graduate Program
  - some (non CS/CE/MIS) departments are planning or offer IT-related graduate courses and programs
  - **coordinate and support cross-program collaboration**, much as we do with the IT minor.

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IT Minor applications due April 9th!