Innovative Curricula: Informatics @ UC Irvine

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Computer Science "Topic Explosion"

- A very broad spectrum, with new topics pressuring existing curricula every day
 - bioinformatics
 - medical informatics
 - cyber-security & privacy
 - crisis response
 - ubiquitous computing
 - game culture & technology
 - K-12 education



A Spectrum of Concerns

People, Organizations

> Different fundamentals, techniques, approaches, principles, and practices underlie different parts of this spectrum



Bren School B.S. Degree Programs



Informatics



Informatics: What Do We Mean?

Interdisciplinary study of the design, application, use and impact of information technology

- software and information
- development and design
- technical and social
- creation and analysis/understanding

Broadly speaking: computing and people

Key characterization: a design discipline focusing on the relationship between information technology design and use in social and organizational settings



Informatics Pedagogical Philosophy

- Studio-style design courses
- Multi-course sequences
- Balance theory and practice
- Apply spiral approach of "just in time learning"
- End-of-year projects and year-long senior project
- Be excellent designers, but know how to build too
- Group work from the start
- Encourage creativity and reflection
- Designed from the ground up as an integrated fouryear curriculum



Course Comparison (Part 1)

	INF	CS	CSE	ICS
Intro programming/data structures	••	••	•••	••
Algorithms/theory	•	•••	••	••
Digital signal processing			•••	
Circuit analysis/chip design			•••	
Digital logic		•	•	•
Computer architecture		••	•	••
Networking		•	•	
Compilers/operating systems		••	••	••
Graphics			•	
Artificial intelligence		•		•
Programming languages	••	•	•	•



Course Comparison (Part 2)

	INF	CS	CSE	ICS
Programming languages	••	•	•	•
Information and database management	••••			
Software engineering	••••	•	•	••
Software design	•••			
Human-computer interaction	••			
Social/organizational impact	•••			•
Project management/collaboration	••			
Design/project	•••	•••	•••	•••
Additional tech/CS required		••	••	••
Mathematics	•••	••••••	••••••	••••••
Natural sciences		•••	••••	



Student Numbers

	Fresh.	Soph.	Jun.	Sen.	Total
Spring 2005	10	17	1	0	28
Spring 2006	9	20	19	2	50
Spring 2007	10	20	24	23	77
Spring 2008	6	21	31	57	115



Difficult Experiences

The name "Informatics"

- lots of recruitment materials
- Informatics Q&A on web site
- outreach efforts
- repeated exposure
- parents
- Choosing the right major is difficult for freshmen
 - allow seamless transfer among majors until the end of the first year, despite different courses
 - http://www.ics.uci.edu/ugrad/degrees/advisor
- Balancing the programmers versus the non-programmers
- Inflexibility of the program due to many new courses
- Initial high percentage of female students has dropped
- Skepticism in industry (but...)



Positive Experiences

Informatics students have been superb

- Breadth of interests and background among the Informatics students
 - programmers versus non-programmers
- First class of 12 students graduated this Spring
 - very positive feedback on final survey
 - representative of breadth of the program
 - strong career paths
- Industry has begun to recognize and support the program
 - "reverse recruitment visits"
 - project classes

Faculty are very engaged with the program
 FIPSE and NSF support



Thank you

http://www.ics.uci.edu/informatics/ugrad



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Back-up Slides



Future

The experiment continues

 larger sustainable base of students is needed

 Name change of and/or tracks in the program

 very divided opinions among the faculty

 Monitor the students after graduation
 High-school outreach
 Community colleges



The Informatics Focus





Informatics

Organization System Issues		Organization System Issues		Organization System Issues	
Application Technologies		Application Technologies		Application Technologies	
Software Development		Software Development		Software Development	
Systems Infrastructure		Systems Infrastructure		Systems Infrastructure	
Computer HW & Architecture		Computer HW & Architecture		Computer HW & Architecture	
CE	Theory, Principles, Innovation more theoretical Theory, Peployment, Configuration	SE	Theory, Principles, Innovation more theoretical Theory, Peployment, Configuration	IS	Theory, Principles, Innovation more theoretical Theory, Principles, Configuration More practical
Organization		Organization		Organization	
Organization System Issues		Organization System Issues		Organization System Issues	
Organization System Issues Application Technologies		Organization System Issues Application Technologies		Organization System Issues Application Technologies	
Organization System Issues Application Technologies Software Development		Organization System Issues Application Technologies Software Development		Organization System Issues Application Technologies Software Development	
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Resulting Skills

Able to design and coordinate implementation of software and information systems

- not hackers, not just tool users or coders
- instead, professionals who
 - write software but also do much more
 - design with expertise
 - Iisten to programmers and other people involved
 - interact with customers
 - * analyze, compare, and discuss the quality of alternative designs
 - devise the best implementation techniques in every situation
 - understand the role of quality control
 - adapt to changing requirements

Able to adapt to new concepts and technologiesAble to act as agents of change



Areas of Study

- Software engineering
- Human-computer interaction
- Project management
- Programming languages
- Databases
- Computer-supported collaborative work
- IT organizations
- User modeling
- Information retrieval, management, and visualization
- Ethics, privacy & security
- Computation-social relationships
- And others at the periphery
 - business, management, organizational computing, social science, cognitive science, anthropology, digital arts, game technology, medical informatics, and so on



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No.







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Curriculum

Fall Year 1	Winter Year 1	Spring Year 1
Informatics Core	Informatics Core	Informatics Core
		Informatics Research Topics
Writing	Writing	Writing
Critical Reasoning	Discrete Mathematics	Fundamental data structures
Fall Year 2	Winter Year 2	Spring Year 2
Statistics	Human-Computer Interaction	Project in HCI and User Interfaces
Concepts in Programming Lang. I	Concepts in Programming Lang II	File and Database Management
Requirements Analysis & Engr.	Software Methods & Tools	SW Specification & Quality Engr.
Breadth	Breadth	Breadth
Fall Year 3	Winter Year 3	Spring Year 3
Social Analysis of Computerization	Organizational Information Systems	Proj in Social & Org Impacts of Comp
Software Design I	Software Design II	SW Arch, Dist Syst, & Interoperability
Proj. in File and Database Mgmt	Breadth / Elective	Project Management
Breadth / Elective	Breadth / Elective	Breadth / Elective
Fall Year 4	Winter Year 4	Spring Year 4
Senior Design Project	Senior Design Project	Senior Design Project
Computer-Supported Coop Work	Information Retrieval	Information Visualization
Breadth	Breadth	Breadth / Elective
Breadth / Elective	Breadth / Elective	Breadth / Elective



Who Should Be Interested?

- We expect a broad variety of students with a diverse range of backgrounds
- The degree program moves away from the popular belief that computer scientists are "mad hackers", and instead welcomes students
 - who may not know how to program
 - who have an interest in creative design
 - who generally are curious about designing proper solutions, not just programs
 - who are ready to work with others in a team to solve problems
- Basic skills necessary
 - listening, reading and writing
 - independent, critical, and free thinking
 - a desire for innovation and creativity
 - willingness to work on precise technical problems



Potential Careers

- Software Engineer
- Human-Computer Interface
 Designer
- Information Architect
- Mobile Computing Systems
 Designer
- Game Designer
- **...**

- Systems Analyst
- Management Consultant
- Usability Engineer
- Web Developer

Database Designer/Manager

