INDIANA UNIVERSITY

University Graduate School
2007-2008
Academic Bulletin

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Informatics

School of Informatics
Indianapolis

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Graduate Faculty

(An asterisk [*] denotes membership in the University Graduate School faculty with the endorsement to direct doctoral dissertations.)

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Academic Advisors
Snehasis Mukhopadhyay* (Bioinformatics), Anna McDaniel* (Health Informatics), Anthony Faiola (Human-Computer Interaction), Mahesh Merchant (Laboratory Informatics), Joe Defazio (Media Arts and Science)

Ph.D. Minor in Bioinformatics

Bioinformatics gathers knowledge and information from various fields such as informatics, chemistry, computer science, medicine, and biology. Students in relevant Ph.D. programs such as biochemistry and molecular biology, medical and molecular genetics, medicine, chemistry, or biology are the target audience for the Ph.D. minor in bioinformatics.

A minor in bioinformatics requires 12 credit hours. The core curriculum consists of graduate-level courses in informatics. Electives may be chosen based on personal interests from a broad list of courses in biology, chemistry, computer science, information science, and medical and molecular genetics.

Requirements
The graduate bioinformatics courses in the School of Informatics assume a minimal knowledge of cell and molecular biology. That level of understanding could be gained with at least 6 undergraduate credit hours in molecular biology, genetics, or evolution.

Courses

Core Courses
INFO I500 Fundamental Computer Concepts for Informatics (3 cr.)
INFO I501 Introduction to Informatics (3 cr.)
INFO I502 Information Management (3 cr.)
INFO I505 Informatics Project Management (3 cr.)
INFO I510 Data Acquisition and Laboratory Automation (3 cr.)
INFO I511 Laboratory Information Management Systems (LIMS) (3 cr.)
INFO I512 Scientific Data Management and Analysis (3 cr.)

INFO I530 Legal and Social Informatics of Security (3 cr.) This is a case-based course on privacy and security in social contexts. Privacy and security technologies can diverge from their designers' intent. Privacy-enhancing technologies have been used to defeat data protection legislation, and cryptographic technologies of freedom can be used by corrupt regimes to protect their records from external view.

INFO I531 Seminar in Health Informatics (1-3 cr.) Variable topic. Emphasis is on advanced topics and research in health informatics. Can be repeated with different topics, subject to approval of the Dean.

INFO I532 Seminar in Bioinformatics (1-3 cr.) Variable topic. Emphasis is on advanced topics and research in bioinformatics. Can be repeated with different topics, subject to approval of the Dean.

INFO I533 Seminar in Chemical Informatics (1-3 cr.) Variable topic. Emphasis is on advanced topics and research in chemical informatics. Can be repeated with different topics, subject to approval of the Dean.

INFO I534 Seminar in Human-Computer Interaction (1-3 cr.) P: Graduate Standing. Variable topic. Emphasis is on advanced topics and research in human-computer interaction. Can be repeated with different topics, subject to approval of Dean.

INFO I535 Clinical Information Systems (3 cr.)
INFO I540 Data Mining for Security (3 cr.)

INFO I541 Human-Computer Interaction Design I (3 cr.) Human-computer interaction design (HCID) describes the way a person or group accomplishes tasks with a computer—what the individual or group does and how the computer responds; what the computer does and how the individual or group responds. Sometimes known as "interface design," HCID becomes increasingly important as computing intelligence and connectivity spread ubiquitously to home, work, and play environments. This course will be organized around a collection of readings and three design projects concerned with applying human-computer interaction principles to the design, selection, and evaluation of interactive systems.

INFO I543 HCI Design and Evaluation Methods (3 cr.) Students will learn basic concepts and methods for usability studies and evaluation of interactive systems as well as apply those methods to actual system design evaluations. This course is not only for understanding the basics and traditional approaches in this area, but also for exploring new ways of evaluating the usability of state-of-the-art technology-based systems such as systems in ubiquitous computing, CSCW, tangible and social computing areas.

INFO I546 Music Information Processing: Symbolic (3 cr.) This course deals with both methodology and specific applications that attempt to algorithmically annotate, understand, recognize, and categorize music in symbolic (score-like) form. Particular applications will include key finding, harmonic analysis, note spelling, rhythm recognition, meter induction, piano fingering, and various classification problems such as genre or composer identification. The methodology we will employ will be probabilistic and will include ideas from Machine Learning such as optimal classifiers, hidden Markov models, and Bayesian

networks. Students will have computing assignments, present papers, and be expected to implement solutions to some of the problems we address using a high-level language such as R or Matlab.

INFO I547 Music Information Processing: Audio (3 cr.) This course deals with various music analysis and processing problems that use sampled audio as the primary data representation. We discuss digital signal processing including filtering and its relationship to Fourier techniques. Topics include synthesis, effects processing, score following, and blind music recognition, and accompaniment systems.

INFO I550 Legal and Business Issues in Informatics (3cr.)

INFO I571 Chemical Information Technology (3 cr.) P: Consent of Instructor. Overview of chemical informatics techniques, including: chemical structure coding, chemical data representation, chemical database and search systems, molecular visualization and modeling techniques, and the development of chemical informatics software.

INFO I572 Computational Chemistry and Molecular Modeling (3 cr.) P: INFO-I571. Computer models of molecules and their behavior in gas and condensed phases; implicit and explicit salvation models; quantum and molecular mechanics; search strategies for conformational analysis, geometry optimization methods; information content from Monte Carlo and molecular dynamics simulations; QSAR; CoMFA; docking.

INFO I575 Informatics Research Design (3 cr.)

INFO I576 Structural Approaches to Systems Biology (3 cr.) Computational approaches to characterizing and predicting tertiary protein configuration, based on known data of atomic, intramolecular and intermolecular interactions.

INFO I590 Topics in Informatics (1-3 cr.) Graduate standing. Variable topic. Emphasis is on new developments and research in informatics. Can be repeated with different topics, subject to approval of the Dean.

INFO I690 Topics in Informatics (1-3 cr.) P: Graduate Standing. Variable topic. Emphasis is on new developments and research in informatics. Can be repeated with different topics, subject to approval of the Dean. Course in intended for Ph.D. students in the School of Informatics.

Required Graduate Courses
CSCI 548 Introduction to Bioinformatics (3 cr.)

Electives
A student's committee, working in conjunction with an Informatics committee designated to oversee the minor, will decide what elective courses are appropriate for a given student.

Required Graduate Courses

NEWM N500 Foundations of Digital Arts Production (3 cr.) This course examines issues related to digital media communication in the context of e-commerce and the information industry, especially its impact on the cultural, economic, social, and ethical dimensions of local and global communities. Topics also include usability, intellectual property, and a diversity of user markets for new media products.

NEWM N501 Topic: Foundations of Digital Arts Production (3 cr.) This course examines the production process and management of digital multimedia. Students investigate and produce projects by researching foundations in the use of digital video with special emphasis on production process of storytelling. Skills learned will include project development and video production. Students will develop presentation skills through research papers.