School of Information Science

Welcome to the IU School of Informatics!

Moore's Law says that computing power doubles every 18 months. Regardless of whether that law is literally correct, it illustrates the rapid changes in information technology that will continue for the foreseeable future. The School of Informatics prepares students to meet the continuing demand for information technology professionals who know how to grow and adapt to this environment of rapid technological change.

Informatics is focused on the best applications of technologies and emphasizes the social and psychological aspects of information technology. Some have called informatics "technology with a human face." Informatics prepares professionals to use information technology to solve problems in a variety of settings. The degrees emphasize the development of new uses for technologies, always keeping in mind the needs of people and the best and most appropriate uses for technology.

Informatics students have:

- a technical understanding of how computing systems and programs operate
- an ability to adapt/assess and apply new trends in information technology (IT)
- well-developed problem-solving skills
- experience working on a team, such as those formed for the senior capstone experience
- well-developed communications skills to clearly convey solutions and observations to others
- an understanding of social and ethical principles as they relate to IT issues
- the ability to create 3-D animations to help explain surgery to patients
- accelerated drug discovery through information technology
- developed computer applications to manage disaster relief
- explored human interactions with computers, mobile devices, and robots

Informatics is all of this - and so much more. Harnessing the power and possibility of technology, Informatics turns data and information into knowledge that people can use every day. In the world of information and technology, it's the bridge to all things useful. Informatics is the future.

Degrees from the School of Informatics are unique because they involve students in learning how information technology relates to a traditional discipline in the sciences, liberal arts, or professions. Students of Informatics learn to solve real problems that directly impact our lives and the lives of those around us. They use their technology and problem solving skills to make a difference in the world. For students interested in a career with infinite potential, Informatics stands out as a strong, flexible and dynamic field of study.

The undergraduate curriculum looks at information technology from a balanced perspective. It includes a technical core in the areas of mathematical foundations, distributed information, human-computer interaction, social/organization informatics, and new media. In addition to knowledge of core informatics and of informatics in the context of a traditional discipline, students must take a set of general-education courses to ensure that they can communicate clearly in both written and spoken English, read effectively, and reason quantitatively. They must be able to raise and rationally debate ethical concerns suggested by information technologies and their interactions with other people. Students also must have some knowledge of the world and its peoples, and their cultural, artistic, and scientific achievements. To this end, the general-education requirement exposes students to the arts and humanities, social and historical studies, and the natural sciences.

The school offers a Bachelor of Science in Informatics degree, specialized professional master's degrees, a variety of undergraduate and graduate programs in New Media, a Bachelor of Science in Health Information Administration, and a certificate in Medical Coding. Informatics research is conducted at the Informatics Research Institute, which provides expanded educational opportunities for both undergraduate and graduate students.

Informatics Research Institute

Research and theory in informatics move rapidly to application and development. The faculty teaching in the School of Informatics participate in research activities and new applications of technology. As a result, faculty can transmit state-of-the-art knowledge to their students. Indiana University is capitalizing on this great research strength in informatics with the formation of the Informatics Research Institute (IRI). IRI conducts research in areas of emphases shared with the School of Informatics, including: fundamental research in human-computer interaction; fundamental research in capturing, managing, analyzing, and explaining information and making it available for its myriad uses; and expanding research into policy and socioeconomic issues arising from information technology.

Undergraduate Programs

The School of Informatics offers a Bachelor of Science degree in Informatics, a Bachelor of Science degree in Media Arts and Science, and a Bachelor of Science degree in Health Information Administration.

The very nature of these degrees, with the changing technologies and applications, requires that the content of each degree be continuously assessed and revised. Therefore, the faculty of the School of Informatics will periodically review and revise the curricula to ensure that students are prepared to meet contemporary workplace and intellectual demands. Please contact the School of Informatics office, or refer to our Web site at www.informatics.iupui.edu, to confirm current program requirements.

Probationary Admission

Individuals who do not qualify for a direct admission or whose college grade point average is lower than 2.0 on a 4.0 scale (C) may petition the school for probationary admission. Special consideration is given to adult learners and students returning after five or more years. Petitions

are available from the Informatics Student Services Office, phone (317) 278-4636.

Deadline to petition for the fall semester: **July 15**
Deadline to petition for spring semester: **November 15**
Deadline to petition for summer session: **April 15**

At the discretion of the dean, the School of Informatics may admit on a probationary basis those students who do not meet the minimum requirements for direct admission. To be considered for probationary admission, students must be in the upper two-thirds of their high school graduating class and have combined SAT I math and verbal (critical reading) scores of at least 650. Such students are counseled through the Informatics Student Services Office and remain on probation until they have successfully raised their cumulative grade point average to 2.0 (C) and satisfied any other limitations set. Students admitted on probationary status become eligible for dismissal if they fail to achieve a minimum GPA of 2.3 during each semester until they have reached a minimum cumulative GPA of 2.0 (C). Students who do not achieve a cumulative grade point average of 2.0 (C) after two semesters, or 24 credit hours, will be dismissed.

Academic Regulations

Absences

From Final Examinations Students are required to adhere to the policies regarding final examinations as published in the *Schedule of Classes*.

From Scheduled Classes Illness or equivalent distress is the only acceptable excuse for absence from class. Other absences must be explained to the satisfaction of the instructor, who will decide whether omitted work may be made up.

Credit for Correspondence Courses

With prior approval, the School of Informatics will accept a maximum of two courses (6 credit hours total) by correspondence study to count toward the degree requirements. Only general elective courses may be taken by correspondence. Distance learning courses and courses conducted online are not considered correspondence courses and, therefore, do not have a credit hour limit associated with them.

Degree Application

Candidates for graduation must file an application with the school by March 1 for December graduation and October 1 for May, June, or August graduation. Credits for all course work, except that of the current semester, must be recorded on the candidate's Indiana University transcript at least one month prior to the date of graduation.

Statute of Limitations

Candidates for the bachelor's degree in informatics have the right to complete the degree requirements specified by the bulletin in effect at the time they entered Indiana University, provided that the required courses are available and that no more than eight calendar years have elapsed since the date of entry.

Grading Policies

The School of Informatics follows the official grading system of Indiana University described in the front of this Bulletin.

Pass/Fail

During an undergraduate program, students in the School of Informatics in good standing (not on probation) may enroll in up to a maximum of eight university elective courses to be taken with a grade of P (pass) or F (fail). Students may take up to two Pass/Fail courses during an academic year. The procedure for declaring this option may be found in the Schedule of Classes. A grade of P is not counted in the grade point average; a grade of F is included. Grades of P cannot be changed to any other letter grade.

Probation/Dismissal/Readmission at School of Informatics

Academic Warning

A student whose semester (fall or spring) grade point average (GPA) falls below a 2.0, but whose cumulative GPA is a 2.0 or higher will be placed on academic warning. An advising hold will be placed on the student's record and the student will be required to meet with their academic advisor prior to registration.

Academic Probation

A student whose cumulative grade point average (GPA) falls below a 2.0 will be placed on probation for the subsequent semester. A probation hold will be placed on the student's record and the student will be required to meet with their academic advisor prior to registration. Once the cumulative GPA is 2.0 or higher, the student will be removed from probationary status.

Dismissal

A student on probation who has completed a minimum of 12 IU GPA hours is subject to dismissal if they fail to attain a GPA of at least 2.0 in any two consecutive semesters (fall and spring) and their cumulative IU GPA is below 2.0.

Readmission

Students who are dismissed for the first time must sit out for a minimum of one regular fall or spring semester (not summer) and petition by the established deadlines to be eligible for readmission. Students dismissed two or more times must remain outof school for two regular (fall and spring) semesters and petition by the established deadlines to be eligible for readmission. Readmitted students may only begin in either the fall or spring semester.

Grade Replacement

The Grade Replacement Policy is available only to undergraduate students. It may be exercised for a maximum of 15 credit hours, no more than two times for a given course, with each attempted replacement counting toward the 15 credit hour limit. Any grade may be replaced with the last grade earned for the course, as long as the most recent grade is equal to or higher than the grade being replaced. The replaced grade will then be excluded from the cumulative grade point average. However, the course listing and the replaced grade will remain on the student's academic record with an "X" notation indicating that the grade is excluded from the cumulative grade point average.

The policy became effective beginning with the fall 1996 semester, and any courses being used to replace an earlier grade must have been taken in the fall of 1996 or later. Grades previously granted FX will be honored and

will count toward the 15 credit hour limit. Once invoked, a student may not subsequently request reversal of the grade replacement granted for a given course. Also, this policy is not available for graduate students or students seeking any second undergraduate degree. Please see your academic advisor to discuss grade replacement and obtain a form. For more information about the policy, visit http://registrar.iupui.edu/replace.html

Informatics Degree Programs

Prior to each semester's enrollment, a faculty member or an academic advisor provides academic counseling for each student in the School of Informatics. Although academic counseling is intended to provide effective guidance, students are responsible for planning their own programs and for meeting the following degree requirements for graduation. Students are advised to read bulletin descriptions of all courses selected, paying careful attention to conditions concerning awarding of credit.

Overview

Facilities

Informatics Research Institute

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Contact Information

School of Informatics
Informatics and Communications Complex (IT)
535 W. Michigan Street
Indianapolis, IN 46202
(317) 278-4113

informatics.iupui.edu

Requirements

Admission

Probationary Admission

Individuals who do not qualify for a direct admission or whose college grade point average is lower than 2.0 (C) on a 4.0 scale may petition the school for probationary admission. Special consideration is given to adult learners and students returning after five or more years. Petitions are available from the Informatics Student Services Office, (317)278-4636.

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Such students are counseled through the Informatics Student Services Office and remain on probation until they have successfully raised their cumulative grade point average to 2.0 (C) and satisfied any other limitations set. Students admitted on probationary status become eligible for dismissal if they fail to achieve a minimum GPA of 2.3 during each semester until they have reached a minimum cumulative GPA of 2.0 (C). Students who do not achieve a cumulative grade point average of 2.0 (C) after two semesters, or 24 credit hours, will be dismissed.

Transfer Students

Courses

Graduate Course Descriptions

Informatics

INFO-G 599 Thesis Research (0 cr.)

INFO-I 500 Fundamental Computer Concepts in Informatics (3 cr.) An introduction to fundamental principles of computer concepts for informatics students, including an overview of computer architecture, computer algorithms, fundamentals of operating systems, data structures, file organization and database concepts. This course is expected to impart the required level of competency in computer science. It may be waived in lieu of six undergraduate credit hours of computer science or informatics coursework, covering areas of programming, discrete structures, and data structures.

INFO-I 501 Introduction to Informatics (3 cr.) Basic information representation and processing; searching and organization; evaluation and analysis of information. Internet-based information access tools; ethics and economics of information sharing.

INFO-I 502 Information Management (3 cr.) Survey of information organization in medical, health, chemical, and biology-related areas; basic techniques of the physical database structures and models, data access strategies, management, and indexing of massively large files; analysis and representation of structured and semi-structured medical/clinical/chemical/ biological data sets.

INFO-I 503 Social Impact of Information Technologies (3 cr.) An overview of important social, legal, and ethical issues raised by information technology.

INFO-I 504 Social Dimensions of Science Informatics (3 cr.) Course will examine ethical, legal, and social issues surrounding contemporary research and practice in science informatics. Topics include the nature of science and technology, the ramifications of recent advances in science informatics, and relevant science policy and research ethics. General knowledge of science informatics is assumed.

INFO-I 505 Informatics Project Management (3 cr.) This is a professional introduction to informatics project management and organizational implementation of integrated information solutions. The target audience is informatics project team members likely to pursue

informatics project manager roles as well as all members not likely to do so. Through reading, lecture, discussion, practice, and targeted projects, students gain historical perspectives, current awareness, and proficiency with informatics project management terminology, techniques, and technologies.

INFO-I 506 Globalization and Information (3 cr.) Explores the processes that promote and impede movement of human action and informational activities to the most general levels, e.g., the level of the world as a whole. Surveys diverse theories of globalization to identify the best approaches for professional informatics career planning and making information globally accessible.

INFO-I 510 Data Acquisition and Laboratory Automation (3 cr.) This course covers the entire process by which signals from laboratory instruments are turned into useful data: (1) fundamentals of signal conditioning and sampling; (2) interfacing, communications, and data transfer; (3) markup languages and capability systems datasets; (4) general lab automation; (5) robotics. A significant portion of this course is devoted to practical learning using LabVIEW.

INFO-I 511 Laboratory Information Management Systems for Health and Life Sciences (3 cr.) This course involves a comprehensive study of Laboratory Information/Laboratory Information Management Systems in the Healthcare and Life Sciences. It consists of the history, applications, case studies, functional requirements, databases, data flow, workflows, system and network architecture, laboratory roles, establishment of these systems including selection, installation, customization, integration, and validation.

INFO-I 512 Scientific and Clinical Data Management (3 cr.) Management and mining of data generated in scientific laboratories and clinical trials for data mining and knowledge discovery requires robust solutions that include knowledge discovery techniques and databases, extraction of data/metadata stored in data warehouses that use Storage Use Networks and dealing with security issues of handling this data.

INFO-I 519 Introduction to Bioinformatics (3 cr.) P: One semester programming course or equivalent. Sequence alignment and assembly; RNA structure, protein and molecular modeling; genomics and proteomics; gene prediction; phylogenetic analysis; information and machine learning; visual and graphical analysis bioinformatics; worldwide biologic databases; experimental design and data collection techniques; scientific and statistical data analysis; database and data mining methods; and network and internet methods.

INFO-I 525 Organizational Informatics and Economics Security (3 cr.) Organizational process embed implicit and explicit decisions and information control. Security technologies and implementations make explicit organizational choices that determine individual autonomy within an organization. Security implementations allocate risk, determine authority over processes, make explicit relationships in overlapping hierarchies, and determine trust extended to organizational participants.

INFO-I 529 Machine Learning for Bioinformatics (3 cr.) P: INFO I519, or equivalent knowledge. The course covers advanced topics in bioinformatics with a focus on machine learning. The course will review existing techniques such as hidden Markov models, artificial neural network, decision trees, stochastic grammars, and kernel methods. Examine application of these techniques to current bioinformatics problems including: genome annotation and comparison, gene finding, RNA secondary structure prediction, protein structure prediction, gene expression analysis, proteomics, and integrative functional genomics.

INFO-I 530 Foundations of Health Informatics (3 cr.) This course will introduce the foundation of health informatics. It will review how information sciences and computer technology can be applied to enhance research and practice in healthcare. The basic principles of informatics that govern communication systems, clinical decisions, information retrieval, telemedicine, bioinformatics and evidence based medicine will be explored.

INFO-I 532 Seminar in Bioinformatics (1-3 cr.) Presentation and discussion of new topics in bioinformatics. Concentration on a particular area each semester to be announced before registration. Total credit for seminars and independent study courses may not exceed 9 credit hours.

INFO-I 533 Seminar in Chemical Informatics (1-3 cr.) Presentation and discussion of new topics in chemical informatics. Concentration on a particular area each semester to be announced before registration. Total credit for seminars and independent study courses may not exceed nine 9 hours.

INFO-I 534 Seminar in Human-Computer Interaction (1-3 cr.) Topics vary yearly and include the following: information visualization, immersive technologies, designing hypermedia for educational applications, user-centered design techniques and tools, formal methods and cognitive modeling in HCI. Total credit for seminars and independent study courses may not exceed nine 9 hours.

INFO-I 535 Clinical Information Systems (3 cr.) Clinical Information Systems includes: human computer interface and systems design; healthcare decision support and clinical guidelines; system selection; organizational issues in system integration; project management for information technology change; system evaluation; regulatory policies; impact of the Internet; economic impacts of e-health; distributed healthcare information technologies and future trends.

INFO-I 536 Foundational Mathematics of Cybersecurity (3 cr.) Students will learn mathematical tools necessary to understand modern cybersecurity. The course will cover introductory mathematical material from a number of disparate fields including probability theory, computational theory, complexity theory, group theory, and information theory.

INFO-I 537 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-I 538 Introduction to Cryptography (3 cr.) Introduction to the foundational primitives of cryptography and implementations. A primary goal of this course will be to understand the security definitions for each primitive and how they are used in cryptographic protocols. The ethics of insecure or on-the-fly protocol design will be discussed.

INFO-I 539 Cryptographic Protocols (3 cr.) The class teaches a basic understanding of computer security by looking at how things go wrong, and how people abuse the system. The focus of the class is on how computer systems are attacked, and once this is understood it is possible to propose ways to make the system secure.

INFO-I 540 Data Mining for Security (3 cr.) The objective of this course is to provide an understanding of the impact of data mining in security with a particular focus on intrusion detection. There will be an introduction to data mining where data mining techniques including association rules, clustering and classification are described. Security basics will be presented, focusing on topics such as authentication and access control that are relevant to data mining. This seminar course will explore recent research work in this area and intrusion detection.

INFO-I 545 Music Information Representation, Search and Retrieval (3 cr.) A comprehensive, comparative study of computer-based representation schemes for music, including those oriented toward music notation, music performance, and music analysis. Overview of musical metadata. Techniques and tools for search and retrieval of music information. Credit not given for both INFO I545 and MUS N564.

INFO-I 546 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 Maching 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 problems using a high-level language such as R or Matlab.

INFO-I 547 Music Information Processing: Audio (3 cr.) This course deals with various music analysis nad 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, blind music recognition, and accompaniment systems.

INFO-I 548 Introduction to Music Informatics (3 cr.) History, issues, and applications in music information technology. Survey of various types of musical information. Introduction to digital musical media, including data standards and processing; database structure and organization standards and processing; database structure and organization of audio-, score-, and text file objects; and discussion of copyright issues.

INFO-I 550 Legal and Business Issues in Informatics (3 cr.) Provides students with a solid foundation on legal and business matters that impact informatics and new media, including intellectual property, privacy, confidentiality and security, corporate structure, project planning, tax implications, marketing, obtraining capital, drafting business plans and working with professionals such as attorneys, accountants, and insurance agents.

INFO-I 551 Independent Study in Health Informatics (1-3 cr.) Independent study under the direction of a faculty member, culminating in a written report. May be repeated for credit. Total credit for seminars and independent study courses may not exceed 9 hours.

INFO-I 552 Independent Study in Bioinformatics (1-3 cr.) Independent study under the direction of a faculty member, culminating in a written report. May be repeated for credit. Total credit for seminars and independent study courses may not exceed 9 hours.

INFO-I 553 Independent Study in Chemical Informatics (1-3 cr.) Independent study under the direction of a faculty member, culminating in a written report. May be repeated for credit. Total credit for seminars and independent study courses may not exceed nine 9 hours.

INFO-I 554 Independent Study in Human-Computer Interaction (1-3 cr.) Independent study under the direction of a faculty member, culminating in a written report. May be repeated for credit. Total credit for seminars and independent study courses may not exceed nine 9 hours.

INFO-I 555 Usability and Evaluative Methods (3 cr.) Web usability principles (theory) and practices are covered with a semester-long project that draws upon relationships between Web and software design and usability engineering. Students also learn a collection of user requirement and testing processes and techniques for the development of more usable interactive systems.

INFO-I 556 Biological Database Management (3 cr.) Study about database management and its application to bioinformatics. Topics include data modeling, data indexing and query optimization with a bioinformatics perspective, and database issues in complex nature of bioinformatics data. The course also involves study of current challenges related to bioinformatics data management, data integration and semantic Web.

INFO-I 557 Human Computer Interaction Design I (3 cr.) This course covers human computer interaction theory and application from an integrated approach of knowledge domains, i.e., the cognitive, behavioral, and social aspects of users and user context, relevant to the design and usability testing of interactive systems.

INFO-I 558 Human Computer Interaction Design II (3 cr.) As a continuation of HCI 1, this course introduces students to advanced HCI theories and practices. Areas of study include: product design research methods and issues underlying design thinking, advanced usability practices, and other human-system interaction models. Thesis research planning, methods, and data analysis will also be covered.

INFO-I 563 Psychology of Human Computer Interaction (3 cr.) Covers the psychological and behavioral science of human computer interaction,

including cognitive architecture, memory, problem-solving, mental models, perception, action, and language. Emphasis is placed on developing an understanding of the interaction between human and machine systems and how these processes impact the design and testing of interactive technologies.

INFO-I 564 Prototyping for Interactive Systems (3 cr.) The course covers methodologies for designing and prototyping graphic user interfaces, including rapid (paper) and dynamic (interactive) prototypes. Principles of design research and visual communication are discussed in the context of interaction design, cognition and user behavior, as well as usability testing techniques for concept validation.

INFO-I 571 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-I 572 Computational Chemistry and Molecular Modeling (3 cr.) P: INFO-I 571. Computer models of molecules and their behavior in gas and condensed phases; implicit and explicit solvation models; quantum and molecular mechanics; search strategies for conformational analysis; geometry optimization methods; information content from Monte Carlo and molecular dynamics simulations; QSAR; CoMFO; docking.

INFO-I 573 Programming for Science Informatics (3 cr.) Students will receive a thorough understanding of software development for chem- and bioinformatics, and broaden experience of working in a scientific computing group. Topics include programming for the web, depiction of chemical and biological structures in 2D and 3D, science informatics tool kits, software APIS, AI and machine-learning algorithm development, high-performance computing, database management, managing a small software development group, and design and usability of science informatics software.

INFO-I 575 Informatics Research Design (3 cr.) P: Undergraduate or graduate course in general statistics. Introduction and overview to the spectrum of research in informatics. Qualitative and quantitative research paradigms, deterministic experimental designs to a posteriori discovery. Issues in informatics research; conceptual, design, empirical, analytical, and disseminative phases of research.

INFO-I 576 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. The course presents a balanced and integrative outlook at the various molecular components that determine biological function, sub-cellular organization, dysfunction and even disease examined at the nanoscale.

INFO-I 578 Data Analysis for Clinical Administrative Decision Making (3 cr.) Focuses on understanding, manipulating, and analyzing quantitative data in nursing and healthcare. Includes use of computer-based systems for data management and statistical analysis. Application and interpretation of multivariate statistical models for decision making.

INFO-I 581 Health Informatics Standards and Terminologies (3 cr.) Health information standards specify representation of health information for the purpose of communication between information systems. Standards not only standardize data formats, but also the conceptualizations underlying the data structures. The design process of data standards, domain analysis, conceptualization, modeling, and the methods and tools commonly used are explored.

INFO-I 582 Health Information Exchange (3 cr.) This course describes the drivers and challenges, the data and services of electronic health information exchange (HIE). The five focus areas of HIE are reviewed relative to strategies and actions: Aligning Incentives; Engaging Consumers; Improving Population Health; Managing Privacy, Security and Confidentiality; and, Transforming Care Delivery.

INFO-I 583 Security and Privacy Policies and Regulations for Health Care (3 cr.) This course discusses privacy and security regulations for health care information transactions including policy, procedures, guidelines, security architectures, risk assessments, disaster recovery, and business continuity. Particular attention is given to the Health Insurance Portability and Accountability Act (HIPAA) and the Health Information Technology for Economic and Clinical Health (HITECH) Act.

INFO-I 584 Practicum in Health Information Technology (3 cr.) This course provides an opportunity for the learner to synthesize all previous coursework and to demonstrate beginning competency in Health Information Technology (HIT) applications. The course employs an application focus in which the learner demonstrates comprehension, critical thinking, and problem-solving abilities within the context of a real-world environment.

INFO-I 590 Topics in Informatics (1-3 cr.) Variable topic. Emphasis is on new developments and research in informatics. Can be repeated with different topics, subject to approval of the Dean.

INFO-I 600 Professionalism and Pedagogy in Informatics (3 cr.) Course will introduce students to topics and skills necessary for entering careers in industry or the academy. Topics covered will include career planning, curriculum development, effective teaching, research ethics, scholarly and trade publiching, grantsmanship, and intellectual property consideration.

INFO-I 601 Introduction to Complex Systems (3 cr.) The course will cover fractals, emergent behavior, chaos theory, cooperative phenomena, and complex networks. Students will learn how to think differently about complexities, finding ways to understand their complexity and addressing the problems they pose.

INFO-I 604 Human Computer Interaction Design Theory (3 cr.) The course will explore, analyze, and criticize underlying assumptions and the rational rationale behind some of the most influential theoretical attempts in HC and related fields. The purpose of the course is to make students aware of how theories can influence

practice and to develop critical thinking around the role, purpose, and function of theories.

INFO-I 605 Social Foundations of Informatics (3 cr.) Topics include the economics of information businesses and information societies, legal and regulatory factors that shape information and information technology use, the relationship between organization cultures and their use of information and information technology, and ownership of intellectual property.

INFO-I 611 Mathematical and Logical Foundations of Informatics (3 cr.) An introduction to mathematical methods for information modeling, analysis, and manipulation. The topics include proof methods in mathematics, models or computation, counting techniques and discrete probability, optimization, statistical inference and core advanced topics that include, but are not limited to, Markov chains and random walks, random graphs, and Fourier analysis.

INFO-I 617 Informatics in Life Science and Chemistry (3 cr.) P: Advanced graduate standing or consent of instructor. Introduces the fundamental notions in genome and proteome informatics and chemical informatics focus. Introduces students to major historical, contemporary, and emerging theories, methods, techniques, technologies, and applications in the field of bioinformatics. Students will explore relevant and influential research, results, and applications. Students will develop an understanding of leading research approaches and paradigms, and will design an independent research program in relation to their individual research fields and personal interests. The course will focus on research approaches in bioinformatics, emerging technologies in biology and chemistry, and basic computational techniques, using the design and organizing issues in information systems used in those areas. The course is designed for students with no biology or chemistry background, but some knowledge in informatics, who want to learn basic topics in bioinformatics and chemical informatics.

INFO-I 619 Structural Bioinformatics (3 cr.) Course covers informatics approaches based on the sequence and 3D structure of biological macromolecules (DNA, RNA, Protein) whose objective is to improve our understanding of the function of these molecules. Topics will include molecular visualization; structure determination, alignment, and databases; and prediction of protein structure, interactions, and function.

INFO-I 621 Computational Techniques in Comparative Genomics (3 cr.) Course will summarize computational techniques for comparing genomes on the DNA and protein sequence levels. Topics include state-of-the-art computational techniques and their applications: understanding of hereditary diseases and cancer, genetic mobile elements, genome rearrangements, genome evolution, and the identification of potential drug targets in microbial genomes.

INFO-I 624 Advanced Seminar I–Human-Computer Interaction (3 cr.) P: Advanced graduate standing or consent of instructor. Introduces students to major historical, contemporary, and emerging theories, methods, techniques, technologies, and applications in the field of human-computer interaction. Students will explore relevant and influential research, results, and application. Students will design an independent research program in relation to their individual research fields and personal interests.

INFO-I 627 Advanced Seminar I–Bioinformatics (3 cr.) P: Advanced graduate or consent of instructor. Introduce students to major historical, contemporary, and emerging theories, methods, techniques, technologies, and applications in the field of bioinformatics. Student will explore relevant and influential research, results, and applications. Students will develop an understanding of leading research approaches and paradigms, and will design an independent research program in relation to their individual research fields and personal interests. The course will focus on research approaches in bioinformatics, and emerging technologies in biology and chemistry, and basic computational techniques.

INFO-I 628 Advanced Seminar in Complex Systems (3 cr.) Introduces students to major historical contemporary and emerging theories, methods, and techniques in the filed of complex systems. Students will examine and explore relevant and influential research, results and applications. Students will develop an understanding of leading research approaches and paradigms and will design an independent research program in relation to their individual research fields and personal interests. The course will focus on the theory of complex systems, systems science and artificial life.

INFO-I 634 Advanced Seminar II – Human Computer Interaction (3 cr.) P: Advanced graduate standing or consent of instructor. Introduces students to major historical, contemporary, and emerging theories, methods, techniques, technologies, and applications in the field of human-computer interaction. Students will explore relevant and influential research, results, and applications. Students will develop an understanding of leading research approaches and paradigms, and will design an independent research program in relation to their individual research fields and personal interests.

INFO-I 637 Advanced Seminar II – Bioinformatics (3 cr.) P: Advanced graduate standing or consent of instructor. Introduces students to major historical contemporary and emerging theories, methods, and techniques in the field of Bioinformatics. Students will examine and explore relevant and influential research, results and applications. Students will develop an understanding of leading research approaches and paradigms, and will design and independent research program in relation to their individual research fields and personal interests. The course will focus on research approaches in bioinformatics, emerging technologies in biology and chemistry, and basic computational techniques.

INFO-I 638 Advanced Seminar in Complex Systems (3 cr.) P: Advanced graduate standing or consent of instructor. Introduces students to major historical contemporary and emerging theories, methods, and techniques in the filed of complex systems. Students will examine and explore relevant and influential research, results and applications. Students will develop an understanding of leading research approaches and paradigms, and will design an independent research program in relation to their individual research fields and personal interests. The course will be an exposition of

the science at the edge; and the forefront of research in complex systems.

INFO-I 641 Business of Health Informatics (3 cr.) This class focuses on the economic importance of healthcare information technology adoption for value realization, as a strategic asset, as an investment, and transformation toward integrated decision making. Topics covered include but are not limited to implementation of Decision Support System, barcode tracking, Electronic Health Records, pay-for-performance incentives for e-prescribing.

INFO-I 642 Clinical Decision Support Systems (3 cr.) This course provides an overview of the background and state-of-the-art Clinical Decision Support Systems (CDSS). Topics include: the design principles behind clinical decision support systems, mathematical foundations of the knowledge-based systems and pattern recognition systems, clinical vocabularies, legal and ethical issues, patient centered clinical decision support systems, and the applications of clinical decision support systems in clinical practice.

INFO-I 643 Natural Language Processing and Text Mining for Biomedical Records and Reports (3 cr.) This course familiarizes students with applications of Natural Language Processing and text mining in health care. While the course provides a short introduction to commonly used algorithms, techniques and software, the focus is on existing health care applications including clinical records and narratives, biomedical literature and claims processing.

INFO-I 646 Computational Systems Biology (3 cr.) Introduction of how Omics data are generated, managed, analyzed from large-scale computational perspectives, exploring computational resources, especially biological pathways for integrative mining and computational analysis representing and modeling multiscale biological networks, relating static/dynamic properties to the understanding phenotypic functions at the molecular systems level.

INFO-I 651 The Ethnography of Informatics (3 cr.) Introduces ethnography as a social science methodology and way of knowing with which to study information and its social contexts. Places ethnography in relation to other research methodologies relevant to the production of the informatics knowledge base. Trains students in the use of a broad range of ethnographic techniques relevant to the study of automated information technology in use. Designed to be open to students from other programs with sufficient methodological and substantive background.

INFO-I 656 Translational Bioinformatics Applications (3 cr.) This course entails a cohesive approach to the theory and practice of bioinformatics applications in translational medicine (TM). It includes topics related to the complexities of low, medium and high-throughput applications in TM and powerful solutions to TM data management problems by employing various informatics frameworks.

INFO-I 657 Advanced Seminar II – Chemical Informatics (3 cr.) P: Advanced graduate standing or consent of instructor. Topics vary yearly and include: Representation of chemical compounds: representation of chemical reactions; chemical data, databases and data sources; searching chemical structures; calculation of physical and chemical data (molecular mechanics and quantum mechanics); calculations of structure descriptors; methods for chemical data analysis; integration of chemoinformatics and bioinformatics.

INFO-I 667 Advanced Seminar II—Health Informatics (3 cr.) Advanced graduate seminar in health informatics, designed to complement INFO- I530. Seinartin Health Informatics Applications. This seminar is intended for graduate students enrolled in the Informatics Doctoral Program, taking the Health Informatics Track.

INFO-I 668 Seminar in Health Informatics II (3 cr.) Seminar course covers a variety of research areas in the discipline of health informatics. The seminars provide the students with an opportunity to enrich their academic experience by improving communication and presentational skills, improving interaction with other professionals, extending knowledge in related disciplines, and keeping updated with current issues.

INFO-I 680 Human-Computer Interaction Professional Practice I (3 cr.) This course represents Part One of a two-part course series, which fulfills the final HCI MS project requirement. Part One should showcase the accumulative knowledge of the student in the areas of product design and development. Students will explore relevant and applied research concepts, while considering various HCI design approaches. Final outcomes will include the completion of the first half of the final project, i.e., the completion of a final product.

INFO-I 584 Human Computer Interaction Professional Practice II (3 cr.) Part Two of a two-part course. Part Two showcases the student's accumulative knowledge in areas of product assessment and documentation. Final outcomes include the completion of the second half of the final project, i.e. product testing and analysis and writing of the paper.

INFO-I 690 Topics in Informatics (1-3 cr.) Variable topic. Emphasis on new developments and research in informatics. Can be repeated with different topics, subject to approval of the dean. Course is intended for Ph.D. students in the School of Informatics.

INFO-I 691 Thesis/Project in Health Informatics (1-3 cr.) The student prepares and presents a thesis or project in an area of health informatics. The product is a substantial, typically multi-chapter paper or carefully designed and evaluated application, based on well-planned research of scholarly project. Details are worked out between the student and the sponsoring faculty member. May be repeated for credit until a total of 3 credits is reached.

INFO-I 692 Thesis/Project in Bioinformatics (1-6 cr.) The student prepares and presents thesis or project in an area of bioinformatics. The product is substantial, typically a multi-chapter paper or carefully designed and evaluated application, based on well-planned research or scholarly project. Details are worked out between student and sponsoring faculty member. May be repeated for credit.

INFO-I 693 Thesis/Project in Chemical Informatics (1-6 cr.) The student prepares and presents a thesis or project in an area of chemical informatics. The product is a substantial, typically multi-chapter paper, or a carefully designed and evaluated application, based on well-

planned research or scholarly project. Details are worked out between the student and sponsoring faculty member. May be repeated for credit.

INFO-I 694 Thesis/Project in Human-Computer Interaction (1-6 cr.) The student prepares and presents a thesis or project in an area of human-computer interaction. The product is substantial, typically multi-chapter paper, or a carefully designed and evaluated application, based on well-planned research or scholarly project. Details are worked out between the student and sponsoring faculty member. May be repeated for credit.

INFO-I 698 Research in Informatics (1-12 cr.) Research under the direction of a member of the graduate faculty that is not dissertation related. Can be repeated for credit for a total of 30 credit hours.

INFO-I 699 Independent Study in Informatics (1-3 cr.) Independent readings and research for Ph.D. students under the direction of a faculty member, culminating in a written report. May be repeated for a maximum of 12 credit hours.

INFO-I 790 Informatics Research Rotation (3 cr.) Work with faculty, investigate research opportunities. Can be repeated for a total of 6 credit hours.

INFO-I 798 Professional Practice/Internship (non-credit cr.) Provides for participation in graduate-level professional training and internship experience.

INFO-I 890 Thesis Readings and Research (1-12 cr.) Research under the direction of a member of the graduate faculty leading to a Ph.D. dissertation. Can be repeated for credit for a total of 30 credit hours.

New Media

NEWM-N 500 Principles of Multimedia Technology (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-N 501 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.

NEWM-N 502 Digital Media Motion and Simulation Methods (3 cr.) Applications in animation/ simulation design and creation using computer desktop tools. Examines the fundamentals of three-dimensional animation through storyboards and planning, modeling, texturing, lighting, rendering, and composite techniques. Topics will include nurbs design development, texture mapping for realism and stylistic output, keyframe and path animation, and cinematography lighting techniques. Skills will be developed through design and modeling of individual or team multidisciplinary projects.

NEWM-N 503 Digital Media Application Design Processes (3 cr.) Presents the principles and fundamentals of design techniques using authoring tools on PC, Macintosh, and emerging computer platforms. Included are storyboarding, planning and organization of scripts, use of current technology, computers, video and digital arts equipment; computer-assisted design and project planner software tools and management of design team concepts.

NEWM-N 504 Advanced Interactive Design Applications (3 cr.) Incorporates extensive analysis and use of computer and multimedia authoring tools intended for character simulation design. The course will study the concepts of physics-based bipedal movement in relation to gravity, balance, anticipation, potential energy, personality constructs, and locomotion. Assessment modeling for character depiction and animation will be planned and storyboarded. Other topics include more advanced facets of computer animation including paint tube modeling, layered texture mapping, and track and block animation for cyclical actions.

NEWM-N 505 Internship in Media Arts and Technology (3 cr.) An internship program for students to work with and learn from experts in media (digital arts) technology fields who are developing and using new applications in commercial and educational settings. Requirements for interns include the development of a technology project proposal; interview, resume, and project presentation; on-site intern residency; project report; oral and media presentation of project outcomes.

NEWM-N 506 Media Arts and Technology Project (1-6 cr.) Students create and orally present a multimedia teaching/training project combining elements of digital media technology including CD-ROM, videodisc, digital audio and video, MIDI, and Internet applications. Requirements include technology project proposal development; oral presentation of proposal, research and development of project, project final report, and the presentation of project. Final project to be submitted in digital form for permanent archive.

NEWM-N 510 Web-Database Concepts (3 cr.) Addresses diverse issues arising when designing World Wide Web interface. Basic database concepts will be presented but the course will focus on discussion of interface issues specific to Web databases, technologies for linking databases to Web servers for delivery, discussion of various Web-database applications, case studies, and industry trends.

NEWM-N 553 Independent Study (1-3 cr.) This course provides graduate students in the New Media Program an opportunity to work on a project that is beyond any other existing new media courses. The course focuses on developing graduate students with evaluation, synthesis and analysis abilities through a project to obtain an in-depth knowledge of new media within a context of their choice. A graduate student could be engaged in a research project or a production project.

Health Information Administration

HIA-M 110 Computer Concepts for Health Information (3 cr.) Course provides an overview of applications for the health and medical professionals. Topics include: audit trails, generating, quantifying and analyzing medical reports, word processing, computer hardware, medical

software, copyright and fair usage. Students retrieve and present medical data.

HIA-M 210 Data Organization and Presentation in the Healthcare Environment (3 cr.) Students will study and apply problem solving, decision analysis and data presentation techniques used in healthcare data representation for both internal and external users. ICD and CPT classification systems will be modeled and analyzed utilizing spreadsheets.

HIA-M 220 Healthcare Decision Support (3 cr.) This course provides an overview of essential information technology tools necessary for quantitative and qualitative decision making in a healthcare environment. Students will learn effective methods to analyze patient data including ICD and CPT classification systems as they relate to decision processes in a healthcare environment.

HIA-M 270 Foundations and Principles of Health Information Management (3 cr.) Course focuses on the administration of foundational principles of management within a health information department. Students will gain an understanding of the language of quantitative methods as well as the processes that are required for health information managers to function in a healthcare environment which demands competency in the areas of profit margins, management of financial resources and complex reimbursement processes.

HIA-M 275 Effective Communication for the Healthcare Environment (3 cr.) Course is designed to develop effective interaction among internal and external customers in a healthcare environment. Emphasis is placed on professional communications with superiors, peers and subordinates in all areas of healthcare. Topics include: policy creation, HIM job descriptions, information technology proposal requests, e-mail etiquette and presentation skills.

HIA-M 300 Database Design for Health Information Administration (3 cr.) Introduction to database design with an emphasis on managing data in the health information environment. Topics and concepts include creating data table relationships and normalization. Utilizing Microsoft Access to create user forms and reports. Students will be required to create a large group project.

HIA-M 315 Quantitative Methods and Research (2 cr.) This course will outline the procedures associated with vital statistics in health care (birth/death certificates). The student will learn about the statistics associated with health care. The research portion will focus on data search and access techniques, national research policy making, biomedical and health research investigation, and research protocol data management.

HIA-M 322 Hospital Organization and Management (3 cr.) Orientation to hospital departments hospital organization; inter- and intra-relationships of hospital and community agencies.

HIA-M 325 Health Care Information Requirements and Standards I (3 cr.) This course will outline accreditation standards and regulatory requirements for all aspects of health care including the hospital setting, psychiatric records, and other alternate forms of delivery. It will focus on the content of the health record and documentation requirements, including an orientation to the health information management profession.

HIA-M 326 Laboratory Enrichment for Healthcare Information Requirements and Standards I (1 cr.) This course consists of exercises that reinforce the lectures in HIA-M 325. Students explore up-to-date Web resources used in the healthcare field as well as perform database searches. Students engage in laboratory exercises that consist of evaluating health records for completeness, regulatory compliance and documentation.

HIA-M 327 Healthcare Information Requirements and Standards II (3 cr.) P: M325 This course is a continuation of HIA-M 325 and includes the ongoing review of health record documentation, in particular secondary data bases such as cancer registry, long term care and other healthcare settings. Healthcare information resources, both in print and on the World Wide Web are researched and examined extensively.

HIA-M 328 Laboratory Enrichment for Healthcare Information Requirements and Standards II (1 cr.) P: M325 This course consists of exercises that reinforce the lectures in HIA-M 327. Students explore Web resources used in the healthcare field and perform extensive database searches.

HIA-M 330 Medical Terminology (3 cr.) Understanding and use of the language of medicine including build, analyze, define, pronounce, and spell diagnostic terms that relate to the structure of the body systems. [vocabulary standards]

HIA-M 340 Cancer Registry Fundamentals (3 cr.) This course will outline the organization of cancer registry programs and the operational requirements. Students will learn how to prepare annual reports and how to interpret health information data and translate it into ICD-03 codes.

HIA-M 350 Medical Science for Health Information I (3 cr.) This course will cover pathophysiology and pharmacology associated with the body systems.

HIA-M 355 ICD-9-CM Coding (3 cr.) This course will focus on International Classification of Diseases (ICD) and coding. Students will learn how to code, index, and sequence diagnoses and procedures. Ethical coding guidelines will be taught.

HIA-M 356 Laboratory Enrichment for ICD-9-CM Coding (1 cr.) This course is a laboratory for HIA-M 355 that provides hands-on experience in assigning ICD-9-CM codes. Actual patient records are used for coding practice which focuses on correct code assignment and sequencing of codes to follow ethical coding guidelines. Students will also gain hands-on experience with electronic health records and coding software used in the HIM industry.

HIA-M 370 Health Information Management (3 cr.) This course will focus on human resources management in a Health Information Department.Work scheduling, work flow and work design will be discussed. Other issues in managing an HIM department will be addressed such as education and training, establishing productivity standards, developing a budget and managing contracts.

HIA-M 375 Health information Technology (3 cr.) Introduction to health information standards that have

been developed for the electronic health record and information interoperability and standards in development. Emphasis on understanding healthcare organization networks, intranets, the role of the Internet in patient data access, differences between clinical and administrative information systems used in healthcare organizations and the management and maintenance of those systems.

HIA-M 380 Seminar in Health Information Administration (1-3 cr.) Allows the student to refine their skills in planning health care seminars for the profession, hospitals, and within the classroom setting. Written summaries and oral presentations required.

HIA-M 400 Health Information Storage and Retrieval (3 cr.) This course will focus on the creation of forms design, including the retrieval, filing, and storage of health care information according to the guidelines established by federal and state regulations. Registries will be discussed with specific focus on the cancer registry and master patient index (MPI).

HIA-M 420 Health Care Planning and Information Systems (3 cr.) Understanding the design of systems, research various vendors, present information so that a selection of information system can be recommended. This course will also address systems planning; systems selection process; clinical and business applications of computing in healthcare; resolving organization information issues.

HIA-M 441 Transitional Professional Practicum in Health Information Management I (1-8 cr.) Designed for students who have completed an Associate Degree in HIM from a CAHIIM accredited program. Professional practice experience in a clinical site under direction of an HIA faculty member and an onsite clinical instructor. Practicum experience in the classroom. Emphasis on health information management, business administration and information systems.

HIA-M 442 Transitional Professional Practicum in Health Information Management II (1-8 cr.) P: M441 This course is a continuation of HIA-M 441 and includes professionally supervised experience in an approved clinical site as well as practicum experience in the classroom.

HIA-M 443 Professional Practicum in Health Information Management I (8 cr.) This course is designed to provide professional practice experience in an approved clinical site under the direction of an HIA faculty member and an onsite clinical instructor. Students also receive didactic and practicum experience in the classroom. Emphasis on clinical science, health information management, business administration and information systems.

HIA-M 444 Professional Practicum in Health Information Management II (8 cr.) P: M443 This course is a continuation of HIA-M 443 and includes professionally supervised experience in an approved clinical site as well as practicum experience in the classroom.

HIA-M 445 Medicine and the Law (1 cr.) Presentation of concepts of law in medical and/or health areas as applied to the physician, hospital, health institutions, health information, and individual health workers.

HIA-M 450 Medical Science for Health Information II (3 cr.) P: M350. This course is a continuation of M350. Course will cover pathophysiology and pharmacology associated with the body systems.

HIA-M 455 CPT Coding (3 cr.) P: M355. Focus on Current Procedural Terminology coding. Sequence of procedures as they relate to correct coding guidelines. Study of Health Care Common Procedure Coding System (HCPCS) will also be included.

HIA-M 456 Clinical in Health Information Administration (1 cr.) P: M355 This course is a laboratory for HIA-M 455 that provides hands-on experience in assigning CPT codes. Actual patient records are used for coding practice which focuses on correct code assignment and sequencing of codes to follow ethical coding guidelines. Students will also gain hands-on experience with electronic health records and coding software used in the HIM industry.

HIA-M 457 Practicum in Medical Coding (4 cr.) Course is designed for students completing the Certificate in Medical Coding. Students will participate in a supervised laboratory practicum focusing on the coding of complex medical records using both the ICD and CPT coding systems. Onsite observations related to coding function in approved clinical settings are included in the course content.

HIA-M 459 Clinical in Health Information Administration (6 cr.) Professionally supervised internship in an approved clinical site for management experiences in health information services.

HIA-A 460 Long-Term Care (1 cr.) Discuss the scope of work and the role of long term care. Understand the purpose of the Resident Assessment Instrument (RAI), Minimum Data Set (MDS), and Resident Assessment Protocols (RAPS). Long-term care reimbursement issues addressed.

HIA-M 461 Release of Health Care Information (1 cr.) This course will outline the requirements associated with confidentiality and privacy of health information. This course will focus on Health Insurance Portability and Accountability Act (HIPAA) code sets and transactions privacy.

HIA-M 462 Health Care Quality Improvement (2 cr.) This course will identify quality/performance improvement methods and techniques for health care professionals. Interpretation of data appropriate to user needs and presentation of information will also be covered.

HIA-M 470 Health Care Reimbursement Systems (3 cr.) P: M355,M455 This course will present data elements that apply to prospective payment systems. It will allow the student to gain the knowledge of correct reimbursement systems and to identify issues and patient types in meeting medical necessity guidelines.

HIA-M 480 Seminar in Health Information Administration (1-3 cr.) Allows the student to refine their skills in planning health care seminars for the profession, hospitals, and within the classroom setting. Written executive summaries and oral presentations required. Spring semester only.

HIA-M 485 Health Information Administration Enrichment (1-6 cr.) Current trends, problems, best practices, and developments are discussed that affect the health care profession. Students pursue special interest and share information and experiences with the group. This course is an in-depth exploration of topics and issues in the forefront of health care. Format includes research papers, class discussions, and presentations.

HIA-M 490 Directed Study (1 cr.) This course will reinforce the concepts taught throughout the semester in an independent study approach in order to review for the certification examination.

HIA-M 499 Capstone Experience (3 cr.) This final project will allow the student to synthesize all of the information learned throughout the professional program. Written research projects and oral presentations will test the student's integrated knowledge and abilities across the field.

Undergraduate Course Descriptions

Informatics

INFO-I 100 First Year Experience (1 cr.) This course introduces specific survival skills for success in college and beyond, while reconciling personal learning skills with instructor-based teaching styles. Master the art of inquiry and elevate your sense of integrity while sharpening your personal edge by exploring critical thinking, project management, and current/future job market trends.

INFO-I 101 Introduction to Informatics (4 cr.) Problem solving with information technology; introductions to information representation, relational databases, system design, propositional logic, cutting-edge technologies: CPU, operation systems, networks, laboratory emphasizing information technology including web page design, word processing, databases, using tools available on campus.

INFO-I 112 Basic Tools of Informatics—Programming and Database Concepts (3 cr.) Introduction to programming and database design concepts. Emphasis on problem-solving and information-gathering techniques. The lecture will discuss general concepts and syntax. The lab will focus on the use of software, a programming language, modifying and accessing data using visual tools, and building database applications using forms and development tools. Lecture and laboratory.

INFO-I 130 Introduction to Cybersecurity (1 cr.) P: I101. C: I101. This course introduces students to Cybersecurity. The course will primarily focus on introduction to three core areas (technical aspects of security, organizational aspects of security and legal aspects of security). Through examples of security problems in real life, this course will illuminate fundamental ideas and concepts of information security. Half semester.

INFO-I 201 Mathematical Foundations of Informatics (4 cr.) P: INFO I101 and MATH M118. An introduction to methods of analytical, abstract and critical thinking, deductive reasoning, and logical and mathematical tools used in information sciences. The topics include propositional and predicate logic, natural deduction proof system, sets, function and relationsrelation, proof methods in mathematics, mathematical induction, and graph theory.

INFO-I 202 Social Informatics (3 cr.) P: INFO I101 Introduction to key social research perspectives and literatures on the use of information and communication technologies. Discusses current topics such as information ethics, relevant legal frameworks, popular and controversial uses of technology (e.g. peer-to-peer file sharing), digital divides, etc. Outlines research methodologies for social informatics.

INFO-I 210 Information Infrastructure I (4 cr.) P: INFO I101 C: INFO I101 This course introduces students to software architecture of information systems andthe basic concepts and procedures of systems and applications development. Itcovers the fundamentals of procedural programming and the syntax of modenprogramming languages. It also covers the principles of developing dynamic, data-driven, applications for theWorld Wide Web.

INFO-I 211 Information Infrastructure II (4 cr.) P: INFO I210 This course explors topics in systems architecture of computer applications in greater depth, with emphasis on practices of developing well-designed, reusable software. Designing with reusability is the major information that needs to be delivered. Basic and advanced object-oriented programming skills and applications are introduced. The well-known software architectural pattern Model/View/Controller (MVC) is used.

INFO-I 230 Analytical Foundations of Security (3 cr.) P: INFO-I130. This course will allow students to re-evaluate and conceptualize material learned in discrete courses to consider the topics from their perspective of security. For example, computer system basics such that create vulnerabilities. Vulnerabilies that combine standard hardware and software configurations will be examined, as these illuminate both security and computer networks. Operating systems and file systems are examined from the perspective of access control, permissions, and availability of system services.

INFO-I 231 Introduction to the Mathematics of Cybersecurity (3 cr.) P or C: INFO-I 130. Introduces the basic mathematical tools used in modern cybersecutiry. Covers introductory mathematical material from a number of disparate fields including probability theory, analysis of algorithms, complexity theory, number theory, and group theory.

INFO-I 270 Introduction to Human-Computer Interaction Principles and Practices (3 cr.) Students learn the fundamental principles and practices of human-computer interaction (HCI) and evaluation. Specific focus is given to the introductory knowledge of HCI methods, tools, and techniques for designing and evaluating user interfaces through the use of low and high fidelity prototypes for the Web and software.

INFO-I 275 Introduction to Human-Computer Interaction Theory (3 cr.) Students will learn the fundamental theories of human-computer interaction (HCI) and user-centered design. This course is both a survey of HCI research and an introduction to the psychological, behavioral, and other social science knowledge and techniques relevant to the design of interactive and ubiquitous computing systems.

INFO-I 300 Human-Computer Interaction (3 cr.) An intermediate course that teaches students how to

assess the usability of software through quantitative and qualitative methods, including conducting task analyses, usability studies, heuristic inspections, interviews, surveys, and focus groups. The course also introduces students to the tools and techniques for designing and testing user interfaces based on a human-centered methodology.

INFO-I 303 Organizational Informatics (3 cr.) P: INFO I101. Examines the various needs, uses, and consequences of information in organizational contexts. Topics include organizational types and characteristics, functional areas and business processes, information-based products and services, the use of and redefined role of information technology, the changing character of work, life and organizational practices, sociotechnical structures, and the rise and transformation of information-based industries.

INFO-I 308 Information Representation (3 cr.) P: INFO I201 and INFO I210. The basic structure of information representation in digital information systems. Begins with low-level computer representations such as common character and numeric encodings. Introduces formal design and query languages through Entity Relationship modeling, the Relational Model, XML, and XHTML. Laboratory topics include SQL and XPATH querying.

INFO-I 310 Multimedia Arts and Technology (3 cr.) P: INFO I308. The study of the evolution of media arts and underlying principles of communication. Application development paradigms in current practice.

INFO-I 320 Distributed Systems and Collaborative Computing (3 cr.) P: INFO I211. An introductory treatment of distributed systems and programming. Topics range from the distributed and object models of computation to advanced concepts, such as remote method invocations, object brokers, object services, open systems, and future trends for distributed information systems.

INFO-I 330 Legal and Social Informatics of Security (3 cr.) P: INFO I230, or consent of instructor. This course will examine that set of ethical and legal problems most tightly bound to the issues of information control. The interaction and technology changes, but the core issues have remained: privacy; intellectual property; Internet law; concepts of jurisdiction; speech anonymity versus accountability; and ethical decision-making in the network environment.

INFO-I 350 Foundations in Legal Informatics (3 cr.) This course examines the basic concepts of the design, evaluation and use of technology in the study and practice of law. The course provides an overview of the application of a variety of emerging informatics and new media technologies to the field of law. Will cover technology for law office management, legal research, litigation support, document management, imaging and animations, case management, and electronic court filing.

INFO-I 356 Globalization, Where We Fit In (3 cr.) Globalization increasingly enabled by information technology, changes how we work, what we buy and who we know. New digital technology touches people working eighty-hour weeks in China and others receiving free state-of-the-art drugs in Africa. Learn about the past, present, and future of globalization from an information technology perspective, and what it means for you, your career, and your community.

INFO-I 371 Chemical Informatics I (1 cr.) Basic concepts of information representation, storage, and retrieval as they pertain to chemistry. An overview of the techniques that make modern chemical informatics systems work including the coding techniques that form the basis for chemical information retrieval by structures, nomenclature, and molecular formulas. Various methods of coding for algorithms and techniques used in the modern pharmaceutical industry to enhance research efforts.

INFO-I 372 Molecular Modeling (2 cr.) P: CHEM C341. Molecular modeling and computational chemistry; application of quantum mechanics and molecular mechanics to drive structural and energetic information about molecules; conformational analysis; quantitative structure activity relationships (QSAR) and related methods for drug design.

INFO-I 391 Internship in Informatics Professional Practice (1-3 cr.) P: Approval of the dean and completion of 100- and 200-level requirements in informatics. Students gain professional work experience in an industry or research organization setting, using skills and knowledge acquired in informatics course work. Maximum of six 6 credit hours given for any combination of I391 and I491.

INFO-I 399 Current Topics in Informatics (1-3 cr.) Variable topic. Emphasis is on new developments and research in informatics. Can be repeated twice with different topic.

INFO-I 400 Topics in Informatics (1-3 cr.) P: at least junior standing, or permission of instructor. Variable topic. Emphasis is on new developments and research in informatics. Can be repeated twice for credit when topics vary, subject to approval of the dean.

INFO-I 410 Electronic Discovery (3 cr.) This course will cover the legal, ethical, financial, logistical, procedural and technological considerations of electronic discovery and its implications for lawyers and their clients. It will highlight recently revised federal and state rules, new state and federal legislation and recent court cases that impact electronic discovery policies and processes.

INFO-I 420 Internship in Informatics Professional Practice (3-6 cr.) P: approval of dean and completion of 100- and 200-level requirements in informatics. Students gain professional work experience in an industry or research organization setting, using skills and knowledge acquired in informatics course work.

INFO-I 421 Applications of Data Mining (3 cr.) P: INFO-I 308. This course explores the use of data mining techniques in different settings, including business and scientific domains. The emphasis will be on using techniques, instead of developing new techniques or algorithms. Students will select, prepare, visualize, analyze, and present data that leads to the discovery of novel and usable information.

INFO-I 427 Search Informatics (3 cr.) Techniques and tools to automatically crawl, parse, index, store, and search web information, organizing knowledge that can help meet the needs of organizations, communities and individual users, social and business impact of search

engines technology. As a project, students will build a real search engine and compare it with Google.

INFO-I 430 Security for Networked Systems (3 cr.) P: I230 or permission of instructor. An extensive survey of network security. Covers threats to information confidentiality, integrity, and availability in different layers. Also provides a necessary foundation on network security, such as cryptographic primitives/ protocols, authentication, authorization, and access control teechnologies. Hands-on experience through programming assignments and course projects.

INFO-I 433 Protocol Design and Analysis (3 cr.) Covers the fundamentals of computer security by looking at how things can go wrong, how people can abuse the system, and ways to make the system secure. Students will gain a basic overview of existing security problems and be introduced to methods for addressing such problems. Should be taken by anyone designing, selecting, or using applications in which security or privacy plays a role.

INFO-I 441 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 groups responds. 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-I 453 Computer and Information Ethics (3 cr.) Ethical and professionalization issues that arise in the context of designing and using networked information technologies and information resources. Examines frameworks for making ethical decisions, emergent technologies and their ethical implications, information/ computer professionalism. Topics include privacy, intellectual property, cybercrime, games, social justice, and codes of professional ethics.

INFO-I 465 Informatics for Social Change (3 cr.) This course focuses on the theory and practice of service learning at IUPUI. Students will apply the knowledge of their expertise area in a service project for the local or global community. Projects will be completed through students' current and developing new media production, information technology, and client-based research skills.

INFO-I 470 Litigation Support Systems and Courtroom Presentations (3 cr.) Provide students with an opportunity to use specialized software that is available for organizing, managing, retrieving, and presenting documents and evidence in a legal matter. Students will gain hands-on experience with software tools and learn what is effective and allowable from a technical, legal and ethical standpoint.

INFO-I 475 Informatics in Sports (3 cr.) Technology applications are changing the sports world in biomechanics, sports advancement and injury prevention, equipment, entertainment, gaming, and journalism. The approach of this course is to delineate what digital technologies will progress the sporting field most and changing the way we view athletics. Technologies that once were applied for special effects in cinema are now helping to build better athletes and increasing career longevity.

INFO-I 480 Experience Design and Evaluation of Ubiquitous Computing (3 cr.) The course focuses on ubiquitous computing and related interface/system design, and user-experience issues. Applications include interactive systems which support natural/gesture/touch-based interactions on devices such as mobile, extra-small-and-large displays, and other non-traditional pervasive technologies. Projects include interaction and evaluative techniques: field observation, contextual inquiry, ethnography, survey/interviews, and cognitive walkthrough.

INFO-I 490 Professional Practicum/Internship for Undergraduates (0 cr.) P: approval of the dean. Provides for participation in professional training and internship experience.

INFO-I 491 Capstone Project Internship (3-6 cr.) P: Approval of dean and completion of all required core informatics courses. Students put their informatics education to practice through the development of a substantial project while working in a professional information technology environment. Maximum of 6 credit hours given for any combination of I391 and I491.

INFO-I 492 Senior Thesis (3 cr.) P: senior standing and approval of the dean. The senior student prepares and presents a thesis: a substantial, typically multi-chapter, paper based on a well-planned research or scholarly project, as determined by the student and a sponsoring faculty member.

INFO-I 493 Senior Thesis (3 cr.) P: senior standing and approval of the dean. The senior student prepares and presents a thesis: a substantial, typically multi-chapter, paper based on a well-planned research or scholarly project, as determined by the student and a sponsoring faculty member.

INFO-I 494 Design and Development of an Information System (3 cr.) P: senior standing and approval of the dean. System design and development present both technical and managerial problems with which students will be familiar from their undergraduate course work. This course puts these lessons into practice as students work in teams to develop an information system. Examples of course projects include design and development of a database for a business or academic application, preparation and presentation of an interactive media performance or exhibit, or design and implementation of a simulated environment (virtual reality).

INFO-I 495 Design and Development of an Information System (3 cr.) P: senior standing and approval of the dean. System design and development present both technical and managerial problems with which students will be familiar from their undergraduate course work. This course puts these lessons into practice as students work in teams to develop an information system. Examples of course projects include design and development of a database for a business or academic application, preparation and presentation of an interactive media performance or exhibit, or design and implementation of a simulated environment (virtual reality).

INFO-I 499 Readings and Research in Informatics (1-3 cr.) P: consent of instructor and completion of 100- and 200-level requirements in informatics. Independent readings and research related to a topic of special interest to the student. Written report required. Can be repeated for a maximum of 6 credit hours.

INFO-T 100 Topics in Informatics Technology (1-3 cr.) Variable topic. The course serves an an introduction to a specific information technology in a hands-on setting. Emphasis is on problem solving techniques using technology. Credit hours may not be applied toward satisfying major requirements in the School of Informatics.

INFO-Y 195 Directed Study I (1 cr.) Introduces informatics students to the current job market as they begin their journey to understand this new and ever-expanding discipline. Students will explore various informatics careers in business, education, science, and other related fields. Research, resume writing, identifying and analyzing marketable skills, and preparation for the interview.

INFO-Y 295 Directed Study II (1 cr.) Expands on techniques learned in Y195, including information interviews, job shadowing, mock interviewing, role-playing, alumni mentoring and discussions, and in-depth research into the various career fields.

INFO-Y 395 Career Development for Informatics Majors (1 cr.) Develops skills and knowledge that enable the student to successfully pursue the career search both at the time of graduation and later as the student progresses through their career. The course covers techniques and strategies which make the job search more efficient and effective.

New Media

NEWM-A 481 Advanced 3D Simulation (3 cr.) P: completion of the P track. Advanced course focusing on the creation of high, broadcast-quality simulations. This course will demonstrate mastery of video and animation skills culminating in a final project. Other topics covered include research/planning, marketing, preproduction, production, and postproduction.

NEWM-A 485 Advanced Video Game Design (3 cr.) P: completion of the S track. Advanced course focusing on the creation of an interactive simulation. This course will demonstrate mastery of modeling and conceptual skills culminating in a final project. Other topics covered include research/planning, marketing, preproduction, production, and postproduction.

NEWM-A 490 Advanced Sound Design (3 cr.) P: completion of the P track. Advanced course focusing on the creation of sound effects and soundtracks. This course will demonstrate mastery of composition and editing skills culminating in a final project. Other topics covered include research/planning, marketing, preproduction, production, and postproduction.

NEWM-A 495 Advanced Editing (3 cr.) P: completion of the P track. Advanced course focusing on the editing of sound and video effects. This course will demonstrate mastery of composition and editing skills culminating in a final project. Other topics covered include research/ planning, marketing, preproduction, production, and postproduction.

NEWM-M 355 Web Design (3 cr.) P: N265 and N280. Creation, production, and management of online publications. By utilizing strategic thinking, information architecture, and principles of design, students will successfully launch a media-rich Web site. Other topics covered include file management, developing a target audience, interface design, and design deconstruction.

NEWM-M 360 Interactive Design (3 cr.) P: M350. Synthesize static media, streaming media, and information organization to create an interactive project. By maximizing elements from various media, including audio, video, and static sources, students will test and produce an interactive experience for a target-specific audience. Other topics covered include strategic thinking, audio development, developing assets, project management, and usability testing.

NEWM-M 365 Simulation for Integrated Media (3 cr.) P: M355. Principles of new media, usability and design are combined to create a spatial environment and develop its content. Students will utilize their knowledge of interactivity to develop and exhibit a concept of their creation. Other topics covered include traffic flow management, spatial design, kiosk design, and exhibition design and graphics.

NEWM-M 370 Animation for Integrated Media (3 cr.) P: Completion of two 200-level classes. Images and animation converge to develop an animated sequence. Using text, graphics, and sound, students will create animation and visualizations. Other topics include video editing and sound design.

NEWM-N 100 Foundations of New Media (3 cr.) An exploration of the characteristics of digital media, including interactivity, hypermedia, immersion, and storytelling. Includes an introduction to the practice, theory, and history of new media, from the viewpoint of technology, communication, and culture. There are readings, demonstrations, examples, hands-on projects, and written assignments.

NEWM-N 101 Multimedia Authoring Tools (3 cr.) A hands-on introduction to some of the fundamental tools used in industry to produce interactive media-rich Web pages. Case studies of sites that incorporate text, sounds, graphics, animations, and interactivity. Other topics include the design, development, and deployment of a personal Web site.

NEWM-N 102 Digital Media Imagery (3 cr.) A hands-on introduction to the basic tools used in industry for the creation, editing, manipulation, and uses of 2D raster and vector graphics. Other topics include the integration of imagery into a personal Web site.

NEWM-N 110 Visualizing Information (3 cr.) An introductory course for new media students using traditional and digital media and print best practices. Students develop an understanding of basic design principles and applications. Design history and the elements of composition and typography are applied through exercises and projects. The focus is on foundations of visual thinking, sketching, exploring the relationship between type and image, and developing multiple solutions to a given problem in the context of simple and complex visual information. Computer images will be constructed using the basics of Illustrator.

NEWM-N 175 Digital Media I: Vector Imaging (3 cr.) P: N101. Vector graphics are produced using traditional visualization (sketches) and computer methods. Color theory, geometric construction, perspective, and rendering techniques are utilized in vector-based graphic creation for use in new media applications.

NEWM-N 180 Digital Media II: Raster Imaging (3 cr.) P: N101. Raster graphics are produced using traditional visualization (sketches) and computer methods. Topics will include image composition, realistic representation, digital imaging for new media, color mode and pallet usage, material, and value representation.

NEWM-N 190 Topics in Interactive Media (1-3 cr.) Special topics in interactive media, with a focus on exploring concepts at the forefront of media arts.

NEWM-N 199 Directed Study I (1 cr.) This course introduces the new media student to the current job market and will provide instruction on the development of job promotional material. Students will explore various new media careers in business, education, entertainment, science, and other related fields.

NEWM-N 200 Desktop Tools for Digital Media (3 cr.) A hands-on survey of the wide variety of tools used in creating multimedia animation, video, sound, and digital effects.

NEWM-N 201 Design Issues in Digital Media (3 cr.) Exploration of the traditional principles of visual design, as expressed in digital design tools and applied to digital media. Topics include visual literacy, fundamental design elements and design principles, and their expression in various tools for digital design. Hands-on practice with applying design principles in several projects.

NEWM-N 202 Digital Storytelling (3 cr.) P: N100 Examination of the principles of storytelling across a range of digital media formats, with attention to techniques for creating story-rich projects. Explores the role of agency, interactivity, story structure, and narrative, as well as the opportunities and challenges raised by emerging interactive and transmedia approaches to story-rich projects.

NEWM-N 204 Introduction to Interactive Media (3 cr.) The creation of interactive multimedia products for multi-platform delivery. Topics include the multimedia production process, audience analysis, hardware and software requirements, authoring tools, scripting, content development, interface design, distribution, and development strategies. Concentration will be on real-world applications for interactive multimedia.

NEWM-N 210 Introduction to Digital Sound (3 cr.) P: N101. An introduction to digital sound creation and editing. Topics will focus on analog sound techniques and equipment, analog-to-digital conversion, basic editing, formats and conversions, digital-to-analog conversion, and basic sound effect techniques for new media.

NEWM-N 215 Online Document Development (3 cr.) Study of the creation, publication, and management of documents, images, and other media types on the Web. Topics include Web publishing, asset preparation, document types, contemporary content management systems and their use in the organization. Hands-on experience with contemporary systems for content management.

NEWM-N 221 Media Applications I (3 cr.) Introduces concepts and skills related to the design of interactive multimedia applications for the Web, the desktop, and mobile devices. Within the context of industry-standard application design tools, students use markup tags and scripting to create applications that emphasize graphics, animation, sounds, and interactivity.

NEWM-N 222 Media Applications II (3 cr.) Introduces intermediate concepts and skills related to the design of interactive multimedia applications for the Web, the desktop, and mobile devices. Within the context of industry-standard application design tools, students use information modeling, markup tags, and scripting to create applications that emphasize graphics, animation, sounds, and interactivity.

NEWM-N 230 Introduction to Game Design and Development (3 cr.) P: N221. Introduction to designing and developing games, examining the role that games play in daily life, and analyzing the impact of games in popular culture. Additional topics include world creation, game space design, programming 2D games, character and creature design, animation, and playability testing.

NEWM-N 235 Introduction to Computer Simulation/ Animation (3 cr.) P: N101. An introductory course covering applied three-dimensional computer graphic animation for students interested in the use of design, time and motion study, surface texture mapping, lighting, color, and the technology required to produce computer animations for commercial applications in manufacturing design, marketing, training, gaming, Web creation, and entertainment.

NEWM-N 238 2D Animation (3 cr.) P: N101. Introduction to traditional techniques for 2D animation, and their application in digital media. An exploration of the 12 principles of animation and how to use them to create effective animations.

NEWM-N 240 Introduction to Digital Video (3 cr.) P: N101. An introductory course covering video production techniques for digital media. The technology (hardware and software) along with techniques will be taught through lecture and projects. All phases of video production will be addressed, from pre-production through production to post-production with a focus on the digital media aspects.

NEWM-N 241 Stop Motion Animation (3 cr.) Through lecture and hands-on practice, this class studies the production techniques of stop action animation. Topics include the study of pioneers in the field, evolution from analog to digital techniques, and the building of sets and characters. Students will produce a series of short frame-by-frame digital animations.

NEWM-N 243 Introduction to 3D (3 cr.) An introduction to the concepts and production process of 3D graphics and animation. Students learn basic techniques and theories related to modeling, texturing, lighting, animation, and rendering. Students produce animated graphics and text within the context of various projects.

NEWM-N 250 Team Building in Technology (3 cr.) P: N202. Practical introduction to working in groups of three or more people. Topics include the interpersonal process,

decision-making styles, the creative effort, problem-solving, conflict resolution, leadership, and assessment techniques.

NEWM-N 253 Introduction to Digital Video (3 cr.) P: N202. Introduction to video production techniques for digital media. Hardware, software, and technique are explored through lecture and projects. All phases of video production are addressed, from pre-production through production to post-production with a focus on the digital media aspects.

NEWM-N 255 Introduction to Digital Sound (3 cr.) Introduction to role and function of sound in interactive media. Concepts, theory, and practice related to audio, including voice, music, and sound effects. Effective listening skills, and understanding how people listen and comprehend sound. Experience with tools and techniques for recording, editing, and reproduction.

NEWM-N 256 Digital Composition (3 cr.) P: N102. An introduction to digital cameras and the principles of photographic composition for multimedia. Topics include shot selection, framing, camera movements, and time-based effects, as well as the use of photographs in storytelling.

NEWM-N 260 Scriptwriting (3 cr.) P: N202. An introduction to writing for new media. Concentrating on developing ideas, concepts, plans and stories, students will generate scripts and analysis for numerous new media projects. Other topics covered include writing for scripts, grants, storyboards, and advertising and marketing plans.

NEWM-N 261 Storyboarding for Multimedia (3 cr.) P: N101, N102. Introduction to story and production planning through traditional and digital techniques. Topics include the development of roughs, storyboards, and animatics as planning devices for digital storytelling and other new media products.

NEWM-N 265 Sound Composition (3 cr.) An introduction to digital sound creation and editing. Concentrating on sound effects, voiceover, and composition, students will generate sound for various new media projects. Other topics covered include recording, formatting, effects, editing, and conversion.

NEWM-N 270 Visual Composition (3 cr.) An introduction to the composition of visual information in regards to new media. Students will develop a visual style through digital and traditional methods to tell stories. Other topics covered include digital photography, framing, shot selection, camera movements, and time-based programs.

NEWM-N 275 Visual Practices (3 cr.) An introduction to drawing and idea generation for new media projects. Students will develop control over spatial relationships and defining ideas through drawing and other visualization techniques. Other topics covered include perspective, life drawing, rendering, developing roughs, and advanced storyboards.

NEWM-N 280 Design Principles (3 cr.) An introductory course that will equip students with strategies in assembling visuals applicable to all new media. Students will explore composition strategies in raster- and vector-based problems. Other topics include typography, color theory, grids and layouts, and style.

NEWM-N 284 Building Physical Prototypes (3 cr.) An examination of concept formation for multimedia technology, including current, emerging, and future devices and displays. Learn to build physical and digital prototypes to facilitate idea development and presentation. Students research ideas, develop prototypes, evaluate, and present results.

NEWM-N 285 Interactive Design (3 cr.) P: N101. Examination of issues related to interactivity, including the frameworks, models, and theories related to user interaction with new media products. Topics include user modeling, types of user interfaces, and interaction paradigms.

NEWM-N 288 New Media Marketplace Innovation (3 cr.) Through discussion, reading and writing, this course introduces students to the strategies needed to think outside the box and generate innovation in digital products and services, with an emphasis on existing or potential businesses and markets.

NEWM-N 290 Creative Concept Development (3 cr.) Exploration of creativity, ideation, and concept development. Students learn the processes of creative thinking, idea generation and development, and creative problem solving through specific theories, methodologies, and application in multimedia projects.

NEWM-N 295 Career Enrichment Cooperative (3 cr.) P: N175 and N180; sophomore standing and approval of the dean. A semester of external career experiences designed to enrich the student's preparedness for entering the workforce. Periodic meetings with faculty advisors and a comprehensive written report on the experience detailing the intern's activities and reactions are required.

NEWM-N 299 Directed Study II (1 cr.) P: N199. This course gives a hands-on experience as students interact with employers through guest speakers, networking, mock interviews, and job shadowing.

NEWM-N 300 Digital Media Production (3 cr.) P: N202. Hands-on experience in taking a project through the typical product life-cycle, from initial contact to final acceptance. Topics include communicating with a client, cost estimation, product design, implementation, handling change requests, product documentation, acceptance testing, and post-process review.

NEWM-N 302 Media Simulation Methods (3 cr.) P: N101. A study of the fundamentals and methods of building and using computer-based simulation models, including the utility of simulation as a decision support tool; representing queuing systems in a computer model; simulated sampling from distributions of input variables; point and interval estimates of expected values of output variables, and the design of simulation sampling experiments.

NEWM-N 304 Interactive Media Applications (3 cr.) P: N204. Digital design methodology and techniques, control and timing, machine organization, instruction sequencing, and data flow control; control unit implementation by means of hardware and micro-programming; synchronization of input/output operations with interface design.

NEWM-N 311 The Digital Paradigm Shift: Effects in International Cultures and Society (3 cr.) Examination

of the digital paradigm shift and its global impact on cultures and societies. A study of major paradigm shifts in reference to culture and society as well as the implications for the future. Readings, lectures, class discussions.

NEWM-N 313 Intermediate Web (3 cr.) An examination of the design, production techniques, and management of moderately sized Web sites with an emphasis on designing for multiple platforms and audiences. Topics include layout considerations, designing for multiple platforms, designing for multiple cultures and languages, incorporating accessibility.

NEWM-N 315 Online Document Development II (3 cr.) P: N215. Advanced creation, publication, and management of interactive publications for online distribution with the inclusion of emerging technologies for a media-rich experience. Topics include interactive Web site development, animations for the Web, online interactive design, document conversion, file exchanges, and digital media development for online usage.

NEWM-N 321 ActionScript in 3D (3 cr.) P: N222. Introduces skills for the design and development of interactive 3D applications for the Web and the desktop. Topics include 3D concepts, 3D code libraries, interactivity, system performance issues, and potential applications.

NEWM-N 322 Dynamic Data Applications (3 cr.) P: N222, CSCI-N342. Examines the techniques used in multimedia applications to communicate with back-end data and information services, and to create applications with run-time access to data, information, and media assets.

NEWM-N 328 Visualizing Information (3 cr.) P: N222. Exploration of techniques for using graphics and sound to present data and information. Topics include data types (including data that is geographical and/or time-varying), presentation techniques, effective use of design elements, and effective use of interactive media.

NEWM-N 330 Intermediate Game Design and Development (3 cr.) P: N230. Design and development of 3D games in the context of a 3D game engine. Topics include world creation, game space design, programming, design and modeling of characters and creatures, environmental animation, and playability testing.

NEWM-N 332 Sequential Narrative (3 cr.) P: N202. An introduction to the use of panel-to-panel and frame-to-frame sequential storytelling as foundational elements of animation and storytelling. Other topics covered include pre-visualization, storyboards, and character design.

NEWM-N 335 Character Modeling and Animation (3 cr.) P: N230. Intermediate course in designing characters, for a variety of applications. Topics include character modeling, locomotion, facial animation, and lip movement.

NEWM-N 340 Digital Video Production (3 cr.) P: N 253. Video production techniques for digital media. Preproduction, production, and postproduction of digital video will be addressed and utilized for the completion of a short video project. Other topics covered include directing, editing, media optimization, and assembling assets.

NEWM-N 342 3D Animation (3 cr.) P: N243. Introduction to 3D computer graphic animation for students interested in producing animations for product design, gaming, entertainment, marketing, training, and simulation. Topics include environment design, modeling, motion studies, camera movement, and composition.

NEWM-N 343 3D Modeling (3 cr.) P: N243. Intermediate modeling course, aimed at achieving high-detail, professional quality 3D models for games, film, architecture, science, and other application areas. In-depth use of professional software packages. Possible topics include modeling high-resolution organic characters, modeling foliage and ornate structures, displacement mapping techniques.

NEWM-N 344 3D Production (3 cr.) P: N342 or N343. Team-based course focusing on the creation of high-end, broadcast-quality animations. Team members demonstrate mastery of narrative, modeling, lighting, effects, rendering, and animation skills culminating in a final team project. Other topics include planning, preproduction, production, and postproduction.

NEWM-N 353 Intermediate Video (3 cr.) P: N253. Video production techniques for digital media. Preproduction, production, and postproduction of digital video will be addressed and utilized for the completion of a short video project. Other topics covered include directing, editing, media optimization, and assembling assets.

NEWM-N 355 Intermediate Sound (3 cr.) P: N255. Intermediate course in designing soundtracks and sound effects for various media applications. Topics include digital signal processing, digital sound techniques, sound recording using a variety of synthesizers and samplers, editing techniques, file formats and conversion techniques.

NEWM-N 356 LIghting and Field Production (3 cr.) P: N253. Theoretical and practical application of lighting, filming, and audio recording. Students will work in a variety of locations to encompass as many different environments as possible. Other topics covered include daytime shooting, nighttime shooting, studio shooting, and storytelling.

NEWM-N 357 Digital Effects (3 cr.) P: N253. Integration of computer-generated imagery and digital effects technique for video production. Students learn techniques for creating digital effects, shooting video for effects, and the use of effects to aid in storytelling. Other topics covered include programming/scripting, shooting raw footage, effects, and media integration.

NEWM-N 385 Seeing Sideways: Experimental Approaches to New Media (3 cr.) In this non-traditional open format course students will explore a variety of methods for fostering creative exploration in new media. Discussion, readings, blogging, and directed exercises lead the student to find individual ways of exploring different areas of new media through a variety of output options.

NEWM-N 399 Directed Study III (1 cr.) P: Junior standing. This course applies design and visualization information towards the development of a comprehensive portfolio. The development of the portfolio will provide students with a framework for display of personal growth

and achievement. Students will develop a portfolio to be used for future career opportunities.

NEWM-N 400 Imaging and Digital Media Seminar (3 cr.) Variable titled course designed to bring guest speakers from the industry and other disciplines on campus to expose students to the wide realm of new media and how it can be utilized in each discipline. Class discussions, assigned readings, and research papers.

NEWM-N 410 History and Theory of Digital Media (3 cr.) Examines the history of computer-based media, technologies, and the digital information age. Topics include studying the historical components and developments, as well as present digital media and research speculation towards the future of digital media and technologies.

NEWM-N 413 Advanced Web (3 cr.) P: 313. A survey of advanced issues in Web site design, maintenance, and enhancement. Possible topics include Web analytics, clickstream analysis, ads and other revenue opportunities, payment systems, attracting visitors, and search engine optimization.

NEWM-N 420 Multimedia Project Development (3 cr.) P: Senior standing. Project design in new media. Topics include product planning and design, hardware and software selection, cost estimation, timelines, project management tools, feasibility studies, prototyping, and product presentation. Students work individually or in small groups to develop a project plan suitable for a capstone experience.

NEWM-N 421 Physical Object Interfaces (3 cr.) P: N222. Exploration of the possibilities for interacting with computer applications through physical objects and other tangible media. Introduces the use of several sensor technologies to support interactivity, including cameras, proximity, contact, and RFID. Students design, build, and evaluate applications that address various scenarios.

NEWM-N 422 Advanced Interactive Production (3 cr.) P: N322. A project-based course emphasizing the design, implementation, and evaluation of interactive new media applications. Working individually and in teams, students create multiple products, evaluate the products, and evaluate their own production process.

NEWM-N 430 Advanced Game Design (3 cr.) P: N222, N284. Exploration of the conceptualization, design, production, and evaluation of existing and emerging types of games. Possible topics include serious games, games for mobile devices, and location-aware games. Hands-on experience prototyping game elements.

NEWM-N 431 Game On! (3 cr.) An exploration of the evolution, concepts, and impact of video games. Examines the role of games in popular culture, as well as the impact on contemporary notions of interactivity, learning, and storytelling. Includes discussion of console and online games, casual games, Alternate Reality Games, serious games, and others.

NEWM-N 432 Advanced Sequential Narrative (3 cr.) P: N332. Advanced topics in the creation of sequential narrative using 2D animation. Topics include ideas of pacing, tempo, sequence, and synchronization of graphic and audio elements.

NEWM-N 435 Computer Simulation/Animation III Production (3 cr.) P: N335. Advanced animation course focusing on the creation of high-end simulation productions. This course will focus in more depth on greater story development and on a commercially finished animation. Topics to be covered in lecture format include rigid body dynamics, soft bodies, track animation, nurbs modeling, and particle dynamics. Concept theories will discuss physics and gravity, incorporation of digital sound and music, quality story and character development, and outputting techniques for broadcast application.

NEWM-N 438 Advanced 2D Animcation (3 cr.) P: N238. The creation, development, and production of animation utilizing advanced methods of performance and movement. Possible topics include character and environment design, soundtrack, syncing, backgrounds and animation, and motion principles.

NEWM-N 440 DV and CGI Digital Effects (3 cr.) P: N340 and N335. An advanced course covering the integration of CGI (computer-generated imagery) and digital effect techniques for video production, as used in industry. Students learn the techniques for creating digital effects, shooting video for effects, and the use of effects to aid in the telling of a story. Topics include integration of text, graphics, sound, video, and 2D/3D animation into video productions. Advanced editing and composite techniques will be explored through projects.

NEWM-N 442 Advanced 3D Animcation Techniques (3 cr.) P: N238. Advanced techniques in computer animation, including character development and dynamics. Possible topics include story development, character facial animation and locomotion, dynamics, special effects, composites, fluid effects and particle systems.

NEWM-N 443 Advanced Lighting and Texturing (3 cr.) P: N243. Advanced course in creating 3D objects and environments with specialized texturing and lighting. Possible topics include an examination of state-of-the-art examples, reproduction of results, and production of individual portfolio-quality projects. Possible software includes use of Autodesk Maya, mental ray, Adobe Photoshop and Adobe AfterEffects.

NEWM-N 444 Stereoscopic Production and Display (3 cr.) P: N101. The production and display of stereoscopic imagery for various applications, including games, education, science, virtual reality, and marketing. Topics include human stereoscopic perception, types of stereoscopic displays, evolution of techniques, production issues for various types of stereoscopic media.

NEWM-N 450 Usability Principles for New Media Interfaces (3 cr.) P: N285. Examination of principles of human-computer interaction (HCI) and user experience modeling. Study of user-centered design, usability, and usability testing in the context of new media (hypermedia and multimedia). Topics include aesthetics, human factors, and cognitive psychology as related to user interfaces, navigation, and interactivity.

NEWM-N 453 Advanced Video (3 cr.) P: N353. Application of technical and critical-thinking skills towards understanding the genre of documentary films. Students review, discuss, and analyze several exemplar films, as well as do the research, planning, production, editing,

post-production, and evaluation of a short high-quality documentary.

NEWM-N 455 Advanced Sound Design (3 cr.) P: N355. Students design, record, and edit sound files, apply effects, and mix several audio projects using state of the art technology. Topics include acoustics, circuits, waveforms, digital signal processing (DSP), and studio design and equipment. Emphasis is on practical techniques for integrating sound with other media.

NEWM-N 475 Research in Design Methods (3 cr.) This course is designed to give students an understanding of the advanced concepts of theoretical topics, simulation modeling, and analysis concepts. Investigate applications of simulation in systems characterized by probabilistic behavior.

NEWM-N 480 Technology and the Law (3 cr.) Provides students with a solid foundation on legal matters that impact new media and informatics, including intellectual property (copyright, patents, trademark, trade secrets), contracts, licensing, privacy, publicity, global legal issues, and professional ethics.

NEWM-N 485 Seminar in New Media (3 cr.) Current trends, problems, best practices, and developments in new media. Students pursue a special interest and share information and experiences with the group. This course is an in-depth exploration of topics and issues at the forefront of new media. Seminar format with research papers and class discussion/presentations.

NEWM-N 490 Independent Study (1-6 cr.) Research and practical experience in various areas of new media as selected by the student prior to registration, outlined in consultation with the instructor and approved by the program advisor. Total credit of internship/ independent study shall not exceed 9 credit hours.

NEWM-N 495 Enrichment Internship (3 cr.) P: junior standing and program advisor approval. Industry, corporate, or similar experience in new media-oriented employment. Projects jointly arranged, coordinated, and evaluated by faculty and industrial supervisors. Apply during the semester prior to desired internship. Total credit of internship/ independent study shall not exceed nine 9 hours. Completion of 9 credit hours of new media electives at the 300-400 level is required.

NEWM-N 499 Capstone Experience (3 cr.) To be taken during the students' senior year. The capstone experience is the culmination of the student's major in both knowledge and abilities of a particular area of interest in new media. The successful execution, individually or as a team, integrates student's learning across the field.

NEWM-P 350 Video (3 cr.) P: N260 and N240. Video production techniques for digital media. Preproduction, production, and postproduction of digital video will be addressed and utilized for the completion of a short video project. Other topics covered include directing, editing, media optimization, and assembling assets.

NEWM-P 355 Intermediate Sound (3 cr.) P: N260 and N265. Sound design course developing soundtracks and sound effects. Applying sound construction. Engineering students will produce aural solutions to promote storytelling and atmosphere. Other topics covered include advance sound effects, pacing issues, style, and soundtrack.

NEWM-P 360 Lighting and Field Production (3 cr.) P: P350. Theoretical and practical application of lighting, filming, and audio recording. Students will work in a variety of locations to encompass as many different environments as possible. Other topics covered include daytime shooting, nighttime shooting, studio shooting, and storytelling.

NEWM-P 365 Simulation and Visualization Production (3 cr.) P: P355. Building and using computer-based simulation models skills will be applied to simulate a concept, event, or story. Other topics covered include editing, sound, narration, and effects to clarify concepts. Animation, design, and visual composition.

NEWM-P 370 Digital Effects (3 cr.) P: completion of three 300-level classes from track. Covering the integration of CGI and digital effects technique for video production. Students learn the techniques for creating digital effects, shooting video for effects, and the use of effects to aid in storytelling. Other topics covered include programming/scripting, shooting raw footage, effects, and integrating all new media.

NEWM-S 350 Sequential Narrative (3 cr.) P: Completion of two 200-level classes. Digital techniques and traditional storytelling concepts produce a sequential narrative. Students investigate panel-to-panel and frame-to-frame sequential storytelling as foundational elements of animation. Other topics covered include pre-visualization, storyboards, and character design.

NEWM-S 355 2D Interactive (3 cr.) P: N240 and N275. Concept, production, and development of video games. By developing motivational goals, programming events, and implementing story, students will successfully create a video game experience. Other topics covered include development, sound design, programming, basic animation, and playability testing.

NEWM-S 360 2D Animation (3 cr.) P: S350. Intermediate course focusing on the creation of a narrative through 2D principles. This course will demonstrate mastery of design and illustration skills culminating in a final project. Other topics covered include research/ planning, marketing, preproduction, production, and postproduction.

NEWM-S 365 3D Interactive (3 cr.) P: S355. Intermediate character, concepts, and level design will produce a mod-based game. Students will develop assets within an existing game engine to produce an original game concept. Other topics covered include advanced conceptual design, character modeling, digital painting, and level design.

NEWM-S 370 3D Animation (3 cr.) P: Completion of three 300-level classes from the S track. Intermediate animation course developing high-end simulation productions. Applying construction/rendering techniques and applying physics and dynamics, students will produce a 3D animated narrative. Other topics include advanced character modeling, camera movement, backgrounds, textures, and lighting.

Human-Computer Interaction

The undergraduate certificate in Human-Computer Interaction (HCI) is a 15-credit-hour program allowing students majoring in another subject to become certified in the fundamental theory and application of human-computer interaction.

Courses (15 cr.)

- INFO I270 - Introduction to HCI Principles & Practices
- INFO I275 - Introduction to HCI Theory
- INFO I300 - Human-Computer Interaction
- INFO I480 - Experience Design and Evaluation of Ubiquitous Computing
- NEWM N450 - Usability Principles for New Media Interfaces

Informatics

The undergraduate certificate allows a student majoring in another subject to get appropriate training in informatics and obtain certification as someone who knows how to apply informatics tools to that subject area.

1. Minimum grade of 2.0 (C) in all courses taken for the certificate.
2. Students are required to complete 27 credit hours from the following list:
    - INFO I101 Introduction to Informatics (4 cr.)
    - INFO I202 Social Informatics (3 cr.)
    - INFO I210 Information Infrastructure I (4 cr.)
    - INFO I211 Information Infrastructure II (4 cr.)
    - INFO I300 Human-Computer Interaction (3 cr.)
    - INFO I303 Organizational Informatics (3 cr.)
    - INFO I308 Information Representation (3 cr.)

In addition, students must take an additional course (3 credit hours) from the informatics curriculum. These additional courses can be chosen from the listed electives for informatics and can therefore be taken in another department, if the other department is not the student's major department.

Certificate Programs

Prior to each semester's enrollment, a faculty member or an academic advisor provides academic counseling for each student in the School of Informatics. Although academic counseling is intended to provide effective guidance, students are responsible for planning their own programs and for meeting the following degree requirements for graduation.

Students are advised to read bulletin descriptions of all courses selected, paying careful attention to conditions concerning awarding of credit.

The School of Informatics offers the following undergraduate certificates:

- Informatics
- Medical Coding (2005)
- Human-Computer Interation (2009)

Medical Coding

Certificate

The Medical Coding Certificate is designed for people interested in the medical coding as well as students pursuing a bachelor's degree in another field of study who may wish to enhance their primary degree program.

Upon completion of the Medical Coding Certificate, students are prepared to find employment in a hospital or physician's office. They will be eligible to sit for the Certified Coding Associate (CCA) exam offered by the American Health Information Management Association (AHIMA).

College credit earned for the medical coding certificate can be applied toward the Health Information Administration bachelor's degree.

Medical Coding Certificate Requirements

The student must be admitted to the IUPUI campus and have knowledge of anatomy, physiology, and information technology tools. The Health Information Administration Program Admissions Committee will determine whether the applicant demonstrates adequate knowledge to enroll in the certificate program.

Students are required to receive a minimum grade of C in each course and maintain a minimum cumulative GPA of 2.5.

The School of Informatics reserves the right to amend program requirements. Those interested in the program are strongly encouraged to consult with an academic advisor from the School of Informatics for the latest information available.

Bachelor of Science in Health Information Administration

Health Information Administration

This profession incorporates the disciplines of medicine, management, finance, information technology, and law as they pertain to the complexities of patient care, medical research, information privacy and security, data quality assurance, reimbursement procedures and compliance issues.

Description of the Profession

Health information administrators collect, interpret, and protect health data and determine how data are used. They are managers and information specialists who frequently interact with other members of the medical, financial, and administrative staffs. It is their responsibility to ensure that the information system is protected and driven by accurate, up-to-the-minute information.

Some examples of the responsibilities of department managers follow:

• Determine health information policies.

• Design health information collection, storage, and reporting systems.

• Collaborate in the selection, implementation, use and maintenance of electronic health record systems for processing and storing clinical data.

• Serve on interdisciplinary healthcare committees governing quality standards, improvement, and utilization review.

• Advise on the privacy and security of healthcare information.

• Determine departmental budget and resource needs.

• Assure that the healthcare documentation requirements of various accrediting and governmental agencies are met.

Graduates of the Program

While many health information administrators are employed in hospitals, others work for insurance companies, long-term care and psychiatric facilities, software companies, physician group practices, pharmaceutical companies, and government agencies. They also coordinate quality management programs for health care facilities, teach in colleges and universities, and perform consulting activities.

The program graduate is eligible to seek registration as a Registered Health Information Administrator (RHIA) by successfully passing a national qualifying examination offered by the American Health Information Management Association (AHIMA). RHIA registration is an important credential when seeking employment as a health information administrator.

Bachelor of Science in Health Information Administration

Educational Program

Length of the Program

A four years course of study includes 55 credit hours of prerequisite course work plus 61 credit hours of professional course work. Students apply in spring semester for he fall admission to the professional component of the program, which is offered in the junior and senior years of a Bachelor of Science undergraduate degree. Students apply in the fall for the professional program.

Structure of the Program

The prerequisites and the professional program may be taken on a part-time or full-time basis. Pursing a full time course of study puts the student in the strongest position to pass the national registry exam. Design of the Professional Curriculum The professional courses focus on the management of health information systems and utilization of computerized clinical data. The professional component of the curriculum integrates lecture and laboratory courses with technical and professional practice experiences in hospitals and other health care facilities and related settings.

Additional Cost

In addition to regular university tuition and fees, students should expect to pay lab fees, dues and conference fees related to student membership in AHIMA.

Program Facilities

The Health Information Administration Program is offered in the School of Informatics. Professional practice experiences occur in health care facilities and settings.

Accreditation

The Health Information Administration Program is accredited by the Commission on Accreditation for Health Informatics and Information Management Education (CAHIIM).

Admission

General Information

Students accepted into the program must complete the School's admission process and the program admission requirements described below. Admission to the professional program is competitive; therefore, completion of the prerequisites does not guarantee admission to the program.

Criteria used for Selection of Class

Completion of prerequisite courses, required grade point average and completed application process.

Specific Requirements

In addition to the School of Informatics admission policies and procedures found at the beginning of this section of the bulletin, the following admission policies apply to the Health Information Administration Program.

Application Deadline

January 30th for expected fall admission.

Total Number of Prerequisite Credit Hours 55

Limitations of Course Work

Remedial course work will not count toward the 55 required prerequisite credit hours.

Minimum Cumulative Grade Point Average

2.5 on a 4.0 scale. This requirement is applied at the time of program application and must be maintained. Minimum grade requirement of C (2.0 on a 4.0 scale) or above is required in all prerequisite courses

Curriculum

Prerequisites

Prior to entering the program, students must complete at least 55 credit hours of prerequisites. The current prerequisite plan of study is maintained on the School of Informatics web site. Students should consult with their academic advisors for appropriate courses and semester sequence in order to complete prerequisites. Prerequisites may be taken at any accredited college or university.

Professional Program

Courses in the professional program are sequential and, therefore, must be taken in the order specified by the program faculty. The current professional plan of study is maintained on the School of Informatics web site. Students should consult with their academic advisors for appropriate courses and semester sequence in order to complete the program. A minimum grade of C (2.0) is required in each professional course. While many of the course offerings Whill many courses are available via distance education technology, applicants should be aware that the program is not an entirely online program. Face to face professional practice experiences are required by CAHIIM, the program's accrediting agency.

The School of Informatics reserves the right to amend program requirements. Those interested in the program

are strongly encouraged to consult with an academic advisor from the School of Informatics for the latest information available.

Graduation Requirements

Satisfactory completion of 121 credit hours, including 55 credit hours of prerequisite and general-education courses and 61 credit hours of professional courses. All course work must be completed in compliance with the program's and School's academic and professional policies.

Bachelor of Science in Informatics

Prior to each semester's enrollment, a faculty member or an academic advisor provides academic counseling for each student in the School of Informatics. Although academic counseling is intended to provide effective guidance, students are responsible for planning their own programs and for meeting the following degree requirements for graduation. Students are advised to read bulletin descriptions of all courses selected, paying careful attention to conditions concerning awarding of credit.

General Requirements

Students must successfully complete a minimum of 122 credit hours for the Bachelor of Science degree. The campus at which a student is admitted will award the degree. Students may transfer no more than 60 credit hours toward a Bachelor of Science degree. Students must complete the specific degree requirements of the School of Informatics as listed below.

1. Students must complete a minimum of 50 credit hours in courses at the 300-400 (junior-senior) level.
2. Students must have a minimum cumulative grade point average of 2.0 (C). Any course taken to satisfy the requirements of the major must be completed with a minimum grade of C– unless otherwise specified.
3. Students are expected to complete the requirements for their undergraduate degree within eight years of admission to the School of Informatics. Students are allowed to continue beyond this time period only at the discretion of the dean. If a student has not taken classes for three years or more, that student must satisfy program requirements of the School of Informatics in effect at the time of reactivation. Requests for deviation from requirements listed in the bulletin must be approved in writing by the dean, whose decision is final.
4. Courses that fulfill the requirements for an area of specialization also may meet the general education distribution requirements.
5. Area of specialization courses cannot count as informatics core courses or informatics elective courses.
6. If area of specialization courses are equivalent to informatics core courses, students should substitute additional informatics elective courses in place of informatics core courses to meet the 15-21 credit hour requirement.
7. Courses that fulfill the requirements for a bachelor's degree in informatics also may apply to a minor outside of the School of Informatics.
8. Students must file a degree application with the School of Informatics office by March 1 for December graduation and October 1 for May, June, or August graduation. Failure to file by the deadline may delay the official date of graduation.

Course Requirements

The course work required for the Bachelor of Science in Informatics consists of six parts:

- Required Core A (50 credit hours) (including INFO-I100 First Year Experience)
- Required Core B (6 credit hours)
- Area of Specialization
- General Education Requirements
- General Electives (15-19 credit hours)

Required Core A [50 credit hours]

- INFO I100 First Year Experience (1 cr.)
- INFO I101 Introduction to Informatics (4 cr.)
- INFO I201 Mathematical Foundations of Informatics (4 cr.)
- INFO I202 Social Informatics (3 cr.)
- NEWM N221 Media Applications I (3 cr.)
- INFO I210 Information Infrastructure I (4 cr.)
- INFO I211 Information Infrastructure II (4 cr.)
- NEWM N222 Media Applications II (3 cr.)
- INFO I270 Introduction to Human Computer Interaction (3 cr.)
- INFO I308 Information Representation (3 cr.)
- INFO I399 Research Inquiry (3 cr.)
- INFO I402 Project Management (3 cr.)
- INFO I453 Computer and Information Ethics (3 cr.)
- INFO Y195 Directed Study (1 cr.)
- INFO Y295 Directed Study (1 cr.)
- INFO Y395 Career Development for Informatics Majors (1 cr.)
- INFO I421 Applications of Data Mining and Management (3 cr.)
- INFO I453 Computer and Information Ethics (3 cr.)

Required Core B [6 credit hours]

- Select three informatics courses at the 300 level or above.

Note: The above courses are subject to the successful completion of prerequisites or approval of the instructor. Students also may count other courses with informatics content as informatics electives upon approval of the dean.

Required Capstone [6 credit hours]

- INFO I494/I495 Design and Development of Information Systems (3/3 cr.)

  (senior standing; capstone project), two semester course

- INFO I492/I493 Senior Thesis (3/3 cr.)

  (senior standing; capstone experience)

- INFO I491 Capstone Project Internship (3/3 cr.)

  (senior standing; capstone experience)

Recommended Courses The following course is recommended for students who lack a strong computing background. This course is considered a general elective course.

- INFO I112 Basic Tools of Informatics—Programming and Database Concepts (3 cr.)

Area of Specialization Courses (15-21 cr.)

Departments offering areas of specialiation courses are listed on the informatics Web site (www.informatics.iupui.edu). Students should, in consultation with their academic advisors, choose an area of specialization before their sophomore year. Students must receive a grade of C– or higher in each course, and a cumulative GPA of 2.0 or higher. Students may also be able to receive a minor or certificate.

General Education Requirements

Written Communication (3 cr.)

- ENG W131 Elementary Composition I (or equivalent)

Students must check the listings for courses in the Schedule of Classes each semester to make

certain the course section they have chosen fulfills the requirement.

Oral Communication (3 cr.)

- COMM R110 Fundamentals of Speech Communication

Quantitative & Analytical Skills (6 cr.)

- Three (3) hours from any of the following MATH courses:

  M118; 119; 151; 153; 154; 163; 164

- Three (3) hours from any of the following STAT courses:

301 or 350 Was the issue of which mathematics course students should take ever resolved?

Natural, Mathematical or Computer Science (9 credit hours)

- Arts & Humanities [3 credit hours]
- AFRO A150 Survey of the Culture of Black Americans (3 cr.)
- AMST A103 Topics in American Studies (3 cr.)
- CLAS C205 Classical Mythology (3 cr.)
- CMLT C190 FILM C292 Introduction to Film (3 cr.)
- COMM T130 Introduction to Theatre (3 cr.)
- ENG L105 Appreciation of Literature (3 cr.)
- ENG L115 Literature for Today (3 cr.)
- FLAC F200 World Cultures Through Literature (3 cr.)
- FOLK F101 Introduction to Folklore (3 cr.)
- HER H100 Art Appreciation (3 cr.)
- HER H101 History of Art I (3 cr.)
- HER H102 History of Art II (3 cr.)
- HIST H105 American History I (3 cr.)
- HIST H106 American History II (3 cr.)
- HIST H108 Perspectives on the World to 1800 (3 cr.)
- HIST H113 History of Western Civilization I (3 cr.)
- HIST H217 The Nature of History (3 cr.)
- PHIL P110 Introduction to Philosophy (3 cr.)
- PHIL P120 Ethics (3 cr.)
- REL R133 Introduction to Religion (3 cr.)
- REL R173 American Religion (3 cr.)
- REL R180 Introduction to Christianity (3 cr.)
- REL R212 Comparative Religions (3 cr.)
- MUS M174 Music for the Listener (3 cr.)
- WOST W105 Introduction to Women's Studies (3 cr.)

Social Sciences [3 credit hours]

- AFRO A150 Survey of the Culture of Black Americans (3 cr.)
- ANTH A104 Culture and Society (3 cr.)
- COMM C180 Interpersonal Communication (3 cr.)
- ECON E201 Introduction to Microeconomics (3 cr.) or ECON E202 Introduction to Macroeconomics (3 cr.)
- ENG G104 Language Awareness (3 cr.)
- FOLK F101 Introduction to Folklore (3 cr.)
- GEOG G110 Introduction to Human Geography (3 cr.)
- GEOG G130 World Geography (3 cr.)
- HIST H117 Introduction to Historical Analysis (3 cr.)
- POLS Y101 Principles of Political Science (3 cr.)
- POLS Y103 Introduction to American Politics (3 cr.)
- POLS Y213 Introduction to Public Policy (3 cr.)
- POLS Y219 International Relations (3 cr.)
- PSY B104 Psychology as a Social Science (3 cr.)
- PSY B310 Life Span Development (3 cr.)
- SOC R100 Introduction to Sociology (3 cr.)
- SOC R121 Social Problems (3 cr.)
- WOST W105 Introduction to Women's Studies (3 cr.)

Comparative World Cultures [3 credit hours]

- ANTH A104 Culture and Society (3 cr.)
- CLAS C205 Classical Mythology (3 cr.)
- FLAC F200 World Cultures through Literature (3 cr.)
- GEOG G110 Introduction to Human Geography (3 cr.)
- HIST H108 Perspectives on the World to 1800 (3 cr.)
- POLS Y217 Introduction to Comparative Politics (3 cr.)
- REL R133 Introduction to Religion (3 cr.)
- REL R212 Comparative Religions (3 cr.)

General Electives [15-19 credit hours]

Dual Baccalaureate Degree

In certain circumstances students may be permitted to pursue a Bachelor of Science in Informatics and complete an undergraduate degree in another degree-granting school of the university. Check with an academic advisor for more details.

Second Baccalaureate Degree

In certain cases the dean may admit bachelor's degree holders to candidacy for a second bachelor's degree. When such admission is granted, the candidate must earn at least 60 additional credit hours and meet the requirements of the School of Informatics. Students seeking second degree candidacy should review the guidelines available from the informatics office. Students with a bachelor's degree who wish to further their

education should also consider becoming qualified for admission to a graduate program.

Minor and Certificate in Informatics

The undergraduate minor or certificate allows a student majoring in another subject to get appropriate training in informatics and obtain certification as someone who knows how to apply informatics tools to that subject area.

Certificate in Informatics

1. Minimum grade of 2.0 (C) in all courses taken for the certificate.

2. Students are required to complete 27 credit hours from the following list:
- INFO I101 Introduction to Informatics (4 cr.)
- INFO I202 Social Informatics (3 cr.)
- INFO I210 Information Infrastructure I (4 cr.)
- INFO I211 Information Infrastructure II (4 cr.)
- INFO I300 Human-Computer Interaction (3 cr.)
- INFO I303 Organizational Informatics (3 cr.)
- INFO I308 Information Representation (3 cr.)

In addition, students must take an additional course (3 credit hours) from the informatics curriculum. These additional courses can be chosen from the listed electives for informatics and can therefore be taken in another department, if the other department is not the student's major department.

Minor in Informatics (16–18 cr.)

1. Minimum grade of 2.0 (C) in all courses taken for the minor.

2. Students are required to take three courses from the following list:

- INFO I101 Introduction to Informatics (4 cr.)
- INFO I202 Social Informatics (3 cr.)
- INFO I210 Information Infrastructure I (4 cr.)
- INFO I211 Information Infrastructure II (4 cr.)
- INFO I308 Information Representation (3 cr.)

3. Students are required to take the following upper level courses:

- INFO I300 Human-Computer Interaction (3 cr.)
- INFO I303 Organizational Informatics (3 cr.)

One course from the list of approved informatics elective courses. The course cannot be in the student's major department.

Minor in Business

IUPUI students pursuing a bachelor's degree in the School of Informatics may obtain a minor in business by successfully fulfilling the following requirements:

Section A: Required Business Courses (9 cr.)

- BUS A200 Foundations of Accounting
- BUS K201 The Computer in Business
- BUS L203 Commercial Law I

Prerequisite for each course: Sophomore standing

Section B: Required Business Courses (9 cr.)
Prerequisites for all three courses below: BUS A200, K201, L203, ENG W131, Math 110 or above. These courses do not have to be taken at the same time and may be taken in any sequence.

- BUS F300 Introduction to Financial Management
- BUS M300 Introduction to Marketing
- BUS P300 Introduction to Operations Management

Section C Business Electives (3 cr.) Choose one of the following:

- BUS D301 International Business Environment (P: ECON E201 and E202)
- BUS Z302 Managing and Behavior in Organizations (P: Junior Standing)
- BUS Z311 Ethics and Leadership (1.5 cr.) AND
- BUS Z312 Human Resources and Negotiations (1.5 cr.) (P: Junior Standing)

Requirements to receive a business minor:

- 21 credit hours in business
- Minimum GPA in the seven courses of 2.0 or above
- Four of the seven courses must be taken on the IUPUI campus
- Submit an application for the Kelley School of Business Minor at the beginning of their your final semester at IUPUI

NOTE: Kelley School of Business may adjust requirements. Be sure to check with your advisor.

Bachelor of Science in Media Arts and Science

The Media Arts and Science (MAS) program explores the theory and practice of using digital media to communicate, educate, engage, or entertain. Courses in the program are hands-on and project-based, allowing students to become fluent in the use of contemporary tools for content creation, management, deployment, and assessment. The program also fosters the skills and qualities prized by employers in the 21st century workplace – skills for communication, teamwork, and productivity.

General Requirements

A minimum of 122 credit hours is required for the MAS degree. Students may transfer no more than 60 credit hours from another institution. Students must complete the specific Course Requirements listed below.

Additionally:

- Students must have a minimum cumulative grade point average of 2.0 (C).
- Any course taken to satisfy the requirements of the degree must be completed with a minimum grade of C (a grade of C- does not count).
- Remedial courses are not counted towards the degree.
- A maximum of 12 credit hours may be taken using the Pass/Fail option and applied to University Electives only.
- Once a course has been applied toward one requirement, it cannot be used to satisfy a second requirement, except where explicitly stated otherwise. No course will be counted more than

once toward graduation with the exception of special topics courses, seminars,independent study, internships, and other special courses.
- Students must file a degree application form with the School by March 1 for December graduation and October 1 for May, June, or August graduation. Failure to file by the deadline may delay the official date of graduation.

Course Requirements

The course work required for the Bachelor of Science in Media Arts and Science consists of five parts:

1. Media Arts & Science Core Courses

2. Computing Foundations

3. Course of Study

4. General Education Requirements

5. University Electives

1. Media Arts & Science Core Courses (18 cr.)

- NEWM N100 Foundations of New Media (3 cr.)
- NEWM N101 Multimedia Authoring Tools (3 cr.)
- NEWM N102 Digital Media Imagery (3 cr.)
- NEWM N202 Digital Storytelling (3 cr.)
- NEWM N199 Directed Study I (1 cr.)
- NEWM N299 Directed Study II (1 cr.)
- NEWM N399 Directed Study III (1 cr.)
- NEWM N499 Capstone Experience (3 cr.)

2. Computing Foundations (3 cr.)

- CSCI N301 Fundamental Computer Science Concepts (3 cr.)

3. Course of Study (57 cr.)

The student's Course of Study must include at least 45 credit hours from NEWM courses, with at least 12 hours at the 300-level and 12 hours at the 400 level. Up to 12 hours in the Course of Study may be chosen from the list of Electives, shown here.

Electives

- INFO Any undergraduate course
- HER E101 Beginning Drawing I
- HER E102 Beginning Drawing II
- HER E103 2D Design
- HER E109 Color and Design
- HER E214 Visual Learning
- JOUR J152 Sports in Society
- JOUR J210 Visual Communication
- JOUR J320 Creative Advertising
- CSCI N241 Fundamentals of Web Development
- CSCI N341 Client-Side Web Programming
- CSCI N342 Server-Side Web Programming
- CSCI N351 Intro to Multimedia Programming
- CSCI N451 Web Game Development
- CIT 21400 Introduction to Data Management
- CIT 21500 Web Programming
- CIT 27000 Introduction to Java
- CIT 31200 Advanced Web Site Design
- CIT 41200 XML-Based Web Applications

4. General Education Requirements (22 cr.) Learning Community, INFO I100 (1 cr.)

Communication Skills (9 cr.)

- ENG W131 English Composition I (3 cr.)
- COMM R110 Fundamentals of Speech Communication (3 cr.)

and one of the following:

- JOUR J200 Reporting, Writing, and Editing I (3 cr.) or
- ENG W132 English Composition II (3 cr.), or
- TCM 220 Technical Report Writing (3 cr.)

Analytical Skills (6 cr.)

- MATH M118 Finite Mathematics (3 cr.)
- MATH M153 Algebra and Trigonometry I (3 cr.)
- PHIL P162 Practical Logic (3 cr.)
- PHIL P265 Elementary Symbolic Logic (3 cr.)
- STAT 30100 Elementary Statistical Methods (3 cr.)
- STAT 35000 Data Analysis (3 cr.)

Arts and Humanities (3 cr.)

- CLAS C205 Classical Mythology (3 cr.)
- COMM T130 Introduction to Theatre (3 cr.)
- ENG L105 Appreciation of Literature (3 cr.)
- FILM C292 Introduction to Film (3 cr.)
- FOLK F101 Folklore (3 cr.)
- HER H100 Art Appreciation (3 cr.)
- HER H101 History of Art (3 cr.)
- MUS M174 Music for the Listener (3 cr.)
- PHIL P110 Introduction to Philosophy (3 cr.)
- PHIL P120 Ethics (3 cr.)

Social Sciences and Comparative World Cultures (3 cr.)

- AFRO A150 Afro-American Studies (3 cr.)
- AMST A103 Topics in American Studies (3 cr.)
- ANTH A104 Culture and Society (3 cr.)
- COMM C180 Interpersonal Communication (3 cr.)
- GEOG G110 Intro to Human Geography (3 cr.)
- HIST H105 American History I (3 cr.)
- HIST H108 Perspectives on the World to 1800 (3 cr.)
- HIST H113 History of Western Civilization I (3 cr.)
- HIST H217 The Nature of History (3 cr.)
- POLS Y101 Principles of Political Science (3 cr.)
- POLS Y217 Intro to Comparative Politics (3 cr.)
- POLS Y213 Intro to Public Policy (3 cr.)
- PSY B104 Psychology as a Social Science (3 cr.)
- PSY B310 Life Span Development (3 cr.)
- SOC R100 Sociology (3 cr.)
- SOC R121 Social Problems (3 cr.)
- REL R133 Introduction to Religion (3 cr.)
- REL R173 American Religion (3 cr.)
- REL R212 Comparative Religions (3 cr.)
- WOST W105 Intro to Women's Studies (3 cr.)

5. University Electives (up to 22 cr.) Courses for the remaining credits will be decided by the individual

student, in consultation with an advisor, to fulfill additional career and/or personal interests.

Students may take a maximum of 4 credit hours of HPER elective physical education courses numbered Exxx.

Degree Programs

Prior to each semester's enrollment, a faculty member or an academic advisor provides academic counseling for each student in the School of Informatics. Although academic counseling is intended to provide effective guidance, students are responsible for planning their own programs and for meeting the following degree requirements for graduation.

Students are advised to read bulletin descriptions of all courses selected, paying careful attention to conditions concerning awarding of credit.

The School of Informatics offers the following undergraduate degrees:

- Health Information Administration
- Informatics
- Media Arts and Science

Undergraduate Programs

The School of Informatics offers a Bachelor of Science degree in Informatics, a Bachelor of Science degree in Media Arts and Science, and a Bachelor of Science degree in Health Information Administration.

The very nature of these degrees, with the changing technologies and applications, requires that the content of each degree be continuously assessed and revised. Therefore, the faculty of the School of Informatics will periodically review and revise the curricula to ensure that students are prepared to meet contemporary workplace and intellectual demands.

Please contact the School of Informatics office, or refer to our Web site at http://informatics.iupui.edu/ to confirm current program requirements.

Informatics

The undergraduate minor or certificate allows a student majoring in another subject to get appropriate training in informatics and obtain certification as someone who knows how to apply informatics tools to that subject area.

1. Minimum grade of 2.0 (C) in all courses taken for the minor.
2. Students are required to take three courses from the following list:
   - INFO I101 Introduction to Informatics (4 cr.)
   - INFO I202 Social Informatics (3 cr.)
   - INFO I210 Information Infrastructure I (4 cr.)
   - INFO I211 Information Infrastructure II (4 cr.)
   - INFO I308 Information Representation (3 cr.)
3. Students are required to take the following upper level courses:
   - INFO I300 Human-Computer Interaction (3 cr.)
   - INFO I303 Organizational Informatics (3 cr.)

One course from the list of approved informatics elective courses. The course cannot be in the student's major department.

Business

IUPUI students pursuing a bachelor's degree in the School of Informatics may obtain a minor in business by successfully fulfilling the following requirements:

Section A: Required Business Courses (9 cr.)

- BUS A200: Foundations of Accounting
- BUS K201: The Computer in Business
- BUS L203: Commercial Law I

Section B: Required Business Courses (9 cr.)

Prerequisites for all three courses below: BUS A200, K201, L203, ENG W131, Math 110 or above. These courses do not have to be taken at the same time and may be taken in any sequence.

- BUS F300: Introduction to Financial Management
- BUS M300: Introduction to Marketing
- BUS P300: Introduction to Operations Management

Section C Business Electives (3 cr.)

Choose one of the following:

- BUS D301: International Business Environment (P: ECON E201 and E202)
- BUS Z302: Managing and Behavior in Organizations (P: Junior Standing)
- BUS Z311: Ethics and Leadership (1.5 cr.) AND
- BUS Z312: Human Resources and Negotiations (1.5 cr.) (P: Junior Standing)

Requirements to receive a business minor:

- 21 credit hours in business
- Minimum GPA in the seven courses of 2.0 or above
- Four of the seven courses must be taken on the IUPUI campus
- Fill out an application for the Kelley School of Business Minor at the beginning of their final semester at IUPUI

NOTE: Kelley School of Business may adjust requirements. Be sure to check with your advisor.

Minors

Prior to each semester's enrollment, a faculty member or an academic advisor provides academic counseling for each student in the School of Informatics. Although academic counseling is intended to provide effective guidance, students are responsible for planning their own programs and for meeting the following degree requirements for graduation.

Students are advised to read bulletin descriptions of all courses selected, paying careful attention to conditions concerning awarding of credit.

The School of Informatics offers the following undergraduate minors:

- Business
- Informatics

Student Learning Outcomes

Informatics is an applied, professional computing discipline. It responds to society's need to solve increasingly complex problems in all fields of human endeavor by acquiring, managing and interpreting data. Informatics studies the ways in which people, information and digital technologies interact.

Nearly all fields benefit from the rapidly evolving fields of computing and information science. Informatics graduates solve problems through the application of computing or computation in the sciences, business, the humanities and the arts.

Computing and information technology are evolving rapidly. The student learning outcomes articulated here are central to educating Informatics graduates who possess both the technological and human-centered design skills necessary to develop and deploy useful digital tools that acquire and manage data for informed decision-making. They incorporate intellectual and ethical standards that every School of Informatics graduate should attain.

Bachelor of Science

- Health Information Administration
- Informatics
- Media Arts and Science

Undergraduate Certificate

- Human-Computer Interaction
- Informatics
- Medical Coding

Bachelor of Science in Media Arts and Science

Students in the Media Arts and Science program will acquire competencies in several domains. They will:

1. Understand digital media and its effective use as a form of communication.
2. Communicate ideas effectively in written and oral form to a range of audiences.
3. Work effectively as a member of a team to achieve a common goal.
4. Analyze a problem, identify and evaluate alternatives, plan an appropriate solution.
5. Appreciate the history, theory, and traditions of digital media. Evaluate media from multiple perspectives using the theories, concepts, and language of digital media.
6. Demonstrate mastery of the concepts, techniques, and tools in one or more digital media specialties.
7. Apply knowledge and skills to develop professional quality digital media productions in a timely manner and utilizing best practices and standards.
8. Explain the impact of digital media on individuals, organizations, and society.
9. Acknowledge diverse opinions regarding professional, ethical, legal, and social issues with a global perspective.
10. Appreciate the need for lifelong learning and have a plan for continuing professional development.

Bachelor of Science in Informatics

The Informatics undergraduate student will acquire competencies in the technical dimensions of informatics and information technology (IT). Students will:

1. Demonstrate knowledge and skills in the mathematical and logical foundations of informatics.
2. Define terms and explain basic principles essential to the design and development of IT and computing systems.
3. Acquire fundamental concepts and skills in software architectures and the development of information systems.
4. Demonstrate knowledge and skills in data representation, models, structures, and informatics-centric management.

The Informatics undergraduate will acquire competencies in the social dimensions of informatics and information technology. Students will:

1. Articulate and acquire strategies for staying abreast of major societal trends, such as access, privacy, intellectual property, security and others, affecting the development and deployment of modern day IT.
2. Critically analyze the intended and unintended consequences of IT on individuals, groups, formal and informal organizations at local and global levels.
3. Apply a user-centered approach to interaction design and product usability, including techniques for quantitative and qualitative testing of interface and interaction design.
4. Utilize digital tools to communicate with a range of audiences.
5. Analyze the social, cultural, and organizational settings in which IT solutions will be deployed to increase the chances of successful implementation.

Students will develop critical thinking and problem solving skills that can be applied to at least one other domain of endeavor, such as business, science, the arts, or humanities. They will:

1. Define terms and explain basic principles, concepts and theories from another domain or discipline in which the students' IT skills will be applied.
2. Demonstrate the ability to deploy IT resources in the context of another domain and/or discipline.
3. Synthesize, analyze, and conceptualize information and ideas from multiple sources and perspectives.
4. Evaluate data, arrive at reasoned conclusions and solve challenging problems.
5. Execute a "real world" senior informatics capstone that demonstrates the skills they have acquired throughout their undergraduate education.

Students will develop collaborative skills and the ability to work in teams. They will:

1. Select and effectively utilize oral, written, visual and quantitative communication skills within the context of an interdisciplinary team.
2. Identify and demonstrate the skills, behaviors and attitudes necessary to function as an effective team member, including working cooperatively with diverse group members.
3. Acquire the skills to initiate, manage and execute an IT project.

4. Articulate legal and ethical issues when using the creative work of others; respect the intellectual property of others.

Students will acquire the behaviors of an autonomous, socially responsible professional capable of conducting professional informatics best practice. They will:

1. Create a personal code of ethics; articulate principles for resolving ethical conflicts.
2. Commit to a regular program of continuing education and lifelong learning that is independent of employer sponsorship.
3. Participate in professional organizations that promote responsible computing and service to society.

Bachelor of Science in Health Information Administration

Students in the Health Information Administration program will acquire competencies in several domains. They will:

Domain I - Health Data Management

1. **Health Data Structure, Content and Standards**
   - Manage health data (such as data elements, data sets, and databases).
   - Ensure that documentation in the health record supports the diagnosis and reflects the patient's progress, clinical findings, and discharge status.
   - Maintain processes, policies, and procedures to ensure the accuracy of coded data.
   - Monitor use of clinical vocabularies and terminologies used in the organizations' health information system.

2. **Healthcare Information Requirements and Standards**
   - Develop organization-wide health record documentation guidelines.
   - Maintain organizational compliance with regulations.
   - Ensure organizational survey readiness for accreditation, licensing and/or certification processes.

3. **Clinical Classification Systems**
   - Select electronic applications for clinical classification and coding.
   - Implement and manage applications and processes for clinical classification and coding.

4. **Reimbursement Methodologies**
   - Manage the use of clinical data required in prospective payment systems (PPS) in healthcare delivery.
   - Manage the use of clinical data required in other reimbursement systems in healthcare delivery.
   - Participate in selection and development of applications and processes for chargemaster and claims management.
   - Implement and manage processes for compliance and reporting such as the National Correct Coding Initiative.

Domain II- Health Statistics, Biomedical Research and Quality Management

1. **Healthcare Statistics and Research**
   - Manage clinical indices/databases/registries.
   - Analyze and present data for quality management, utilization management, risk management, and other related studies.
   - Utilize statistical software.
   - Ensure adherence to institutional Review Board (IRB) processes and policies.

2. **Quality Management and Performance Improvement**
   - Organize and coordinate facility-wide quality management and performance improvement programs.
   - Analyze clinical data to identify trends.
   - Analyze and present data for healthcare decision-making (such as demonstrating quality, safety, and effectiveness of healthcare).

Domain III - Health Services Organization and Delivery

1. **Healthcare Delivery Systems**
   - Monitor the impact of national health information initiatives on the healthcare delivery system for application to information system policies and procedures.
   - Interpret, communicate, and apply current laws accreditation, licensure and certification standards related to health information initiatives at the national, state, local, and facility levels.
   - Analyze and respond to the information needs of internal and external customers throughout the continuum of healthcare services.
   - Revise policies and procedures to comply with changing health information regulations.
   - Translate and interpret health information for consumers and advocates.

2. **Healthcare Privacy, Confidentiality, Legal and Ethical Issues**
   - Coordinate the implementation of legal and regulatory requirements related to the health information infrastructure.
   - Manage access and disclosure of personal health information.
   - Develop and implement organization-wide confidentiality policies and procedures.
   - Develop and implement privacy training programs.
   - Resolve privacy issues/problems.
   - Apply and promote ethical standards of practices.

Domain IV: Information Technology & Systems

1. **Information and Communication Technologies**
   - Implement and manage use of technology, including hardware and software, to ensure data collection, storage, analysis and reporting of information.
   - Contribute to the development of networks, including intranet and internet applications to

facilitate the electronic health record (EHR), personal health record (PHR), public health, and other administrative applications.
- Interpret the derivation and use of standards to achieve interoperability of healthcare information systems.

2. **Data, Information, and File Structures**
   - Apply knowledge of data base architecture and design (such as data dictionary, data modeling, data warehousing, and so on) to meet organizational needs.

3. **Data Storage and Retrieval**
   - Apply appropriate electronic or imaging technology for data/record storage.
   - Apply knowledge of database querying and data mining techniques to facilitate information retrieval.
   - Implement and manage knowledge-based applications to meet end-user information requirements.
   - Design and generate administrative reports using appropriate software.

4. **Data Security**
   - Enforce confidentiality and security measures to protect electronic health information.
   - Protect data integrity and validity using software or hardware technology.
   - Implement and monitor department and organizational data and information system security policies.
   - Recommend elements that must be included in the design of audit trail and data quality monitoring programs.
   - Recommend elements that should be included in the design and implementation of risk assessment, contingency planning, and data recovery procedures.

5. **Healthcare Information Systems**
   - Compare and contrast the various clinical, administrative, and specialty service applications used in healthcare organizations.
   - Apply appropriate systems life cycle concepts, including systems analysis, design, implementation, evaluation, and maintenance to the selection of healthcare information systems.
   - Facilitate project management by integrating work efforts, as well as planning and executing project tasks and activities.
   - Formulate planning, design, selection, implementation, integration, testing evaluation, and support for organization-wide information systems.
   - Apply ergonomic and human factors in interface design.

Domain V: Organization and Management

1. **Human Resources Management**
   - Manage human resources to facilitate staff recruitment, retention, and supervision.
   - Ensure compliance with employment laws.
   - Develop and implement staff orientation and training programs.
   - Develop and implement continuing education programs.
   - Develop productivity standards for health information functions.
   - Monitor staffing levels and productivity, and provide feedback to staff regarding performance.
   - Benchmark staff performance data.
   - Develop, motivate, and support work teams.

2. **Financial and Resource Management**
   - Demonstrate knowledge of financial management and accounting principles.
   - Prepare and monitor budgets and contracts.
   - Demonstrate and apply knowledge of cost-benefit analysis techniques to justify resource needs.
   - Manage organization-wide coding and revenue cycle processes.

3. **Strategic Planning and Organizational Development**
   - Develop strategic and operational plans for facility-wide information systems.
   - Assess organization-wide information needs.
   - Facilitate retrieval, interpretation, and presentation of data/information appropriate to user needs.
   - Demonstrate and apply principles of organization behavior to facilitate team building, negotiation, and change management.

4. **Project and Operations Management**
   - Apply general principles of management in the administration of health information services.
   - Assign projects and tasks to appropriate staff.
   - Implement process engineering and project management techniques to ensure efficient workflow and appropriate outcomes.

Human Computer Interaction (HCI) Certificate

Students will understand and apply at a basic level HCI domain knowledge:

1. HCI and usability terms, concepts, principles, and practices.
2. Problem space definition and conceptual models of interactive products.
3. User-centered approaches to interaction design as applied to software and the Web.
4. User profiling and user needs and requirements.
5. Interface design principles and processes; including related areas of visual design.
6. Cognitive and information processing.
7. Processes and life-cycles of interactive product design.
8. Interactive product evaluation and testing methods, both qualitative and quantitative.

Students will understand and demonstrate at a basic level the design and evaluation of interactive products up to the high fidelity prototype stage:

1. Interactive product interface design and prototyping based on user/needs assessments.
2. HCI principles and a user-centered approach to interaction design as applied to software and the Web.
3. Apply evaluation and usability testing methods to interactive products to validate design decisions.

Informatics Certificate

The Informatics certificate student will acquire competencies in the dimensions of information technology. Students will:

1. Define terms and explain basic principles important to the operation of computing systems as well as fundamental programming concepts.
2. Demonstrate knowledge and skills in data representation, models, structures, and management.

The Informatics graduate will attain competencies in the dimensions of information technology. Students will:

1. Acquire strategies for staying abreast of major societal trends, such as access, privacy, intellectual property, security and others, affecting the development and deployment of modern day information technologies.
2. Critically analyze the intended and unintended consequences of an information technology on individuals, groups, formal and informal organizations at local and global levels.
3. Analyze the social, cultural, and organizational settings in which technology solutions will be deployed to increase the chances of successful implementation.

Students will examine the role of information technology in an of their choice (examples: business, computer science, biology, media arts, etc.). They will:

1. Define terms and explain basic principles, concepts and theories from informatics as they impact their area of specialization.
2. Demonstrate the ability to access evolving trends in information technology and information technology research as they impact their base discipline.
3. Synthesize and analyze information and ideas from multiple sources and perspectives.
4. Evaluate data, arrive at reasoned conclusions, and solve challenging problems that involve information technology in their area of specialization.

Students will develop collaborative skills and the ability to work in . They will:

1. Select and effectively utilize oral, written, visual and quantitative communication skills within the context of an interdisciplinary team.
2. Identify and demonstrate the skills, behaviors and attitudes necessary to function as an effective team member, including working cooperatively with diverse group members.
3. Articulate legal and ethical issues when using the creative work of others; respect the intellectual property of others.

Students will adopt the skills, attitudes and behaviors of autonomous, so that they may further the goals of their home discipline. They will:

1. Participate in the development of a personal code of ethics that considers information ethics.
2. Articulate principles for resolving ethical conflicts.

Medical Coding Certificate

Students completing the Medical Coding Certificate will aquire competencies in several domains.

Domain I - Life Sciences

1. **Anatomy and Physiology**
   - Identify the structures and functions of the human body
   - Locate anatomical online lookups (Adam, etc.)
2. **Medical Terminology**
   - Demonstrate their ability to spell, define, and pronounce medical terms of major disease processes, diagnostic procedures, laboratory tests, abbreviations, drugs, and treatment modalities
   - Demonstrate knowledge of root/suffix/prefix word build concepts and common medical terms
3. **Pathophysiology**
   - Identify specific disease processes by human body system
   - Identify cause, diagnosis, and treatment for each disease process
4. **Pharmacotherapy & Laboratory Findings**
   - Recognize the action of drugs such as: absorption, distribution, metabolism and excretion by the body.
   - Differentiate between drug classifications
   - Identify the most commonly prescribed drugs
   - Describe a formulary
   - Match drugs to common conditions
   - Match drugs to lab findings

Domain II - Information Technology

1. **Introduction to Desktop Applications**
   - Demonstrate keyboard and web access skills
   - Identify concepts related to hardware and software
   - Demonstrate knowledge of Microsoft Office Suite applications
2. **Computer Software Applications in Healthcare**
   - Recognize commonly used software in healthcare
   - Compile public reporting for disease and disease trends
   - Describe how acute care organizations store and retrieve electronic health records
   - Analyze different types of encoder software
   - Analyze online coding tools (coding reference tools)

- Evaluate Computer Assisted Coding (CAC) software
- Identify the issues involving the migration from a paper-based Health Information Management department to an electronic Health Information Management department
- Summarize acute care environment vendors and their system strengths.
- Evaluate an Electronic Health Record (EHR)
- Evaluate a Personal Health Record (PHR)
- Evaluate Heath Information Exchanges (HIE)

Domain III - Health Information Management

1. **Introduction to Health Information Management**
   - Recognize the content & structure of healthcare data
   - List the content of medical records
   - State the documentation requirements for medical records
   - Identify legal/ethics issues in Health Information Management such as privacy, security, and the Health Insurance Portability & Accountability Act
   - Recognize release of Information issues
   - Identify the Code of Ethics for Health Information Management
2. **Healthcare Delivery Systems**
   - Identify types of healthcare organizations
   - Identify types of healthcare workers
   - Identify healthcare settings that employ coders
   - Understand the types and levels of Healthcare Delivery Systems in the U.S., and of the governing bodies that regulate the Health Information Management processes, and an understanding how eHIM will change this environment
   - Recognize the organization of healthcare delivery
   - Interpret accreditation standards
   - Discuss licensure/regulatory agencies

Domain IV - Clinical Classification Systems

1. **Basic Diagnosis Coding Systems**
   - Demonstrate knowledge of the International Classification of Diseases ICD-9-CM
   - Recognize diagnostic based prospective payment groups such as DRG, APR-DRG, & RUGS.
   - Recognize the International Classification of Diseases ICD-10-CM
   - Recognize the Systematized Nomenclature of Medicine (SNOMED)
   - Demonstrate knowledge of Current Procedural Terminology (CPT)
   - Recognize procedure based payment systems such as Resource Based Relative Value (RBRV), Evaluation &Management and Ambulatory Payment Classification (APC)
   - Identify the impact that coding and sequencing has on reimbursement
2. **Reimbursement Methodologies**
   - Identify Ambulatory Surgery Center reimbursement
   - Identify third party payers
   - Describe billing and insurance procedures
   - Discuss an explanation of benefits
   - Recognize Quality Improvement Organizations (QIO) and their role in the payment process
   - Identify charge master description and maintenance
   - Describe managed care/capitation
   - Recognize compliance issues
   - Audit and monitor the coding process for regulatory compliance

Admissions

Applications for all graduate certificate and M.S. programs must be received by **January 15 for fall and summer admission** and **September 15 for spring admission**. Applicants to the Ph.D. program are only eligible for fall admission and must apply by January 15.

The Graduate Admissions Committee will not review applications until the application fee and all required materials are completed and received by the deadlines indicated.

If applying to one of our health information technology certificates, please review the application procedures unique to those programs.

Application Procedures for All Students

1. Complete and submit the IUPUI Graduate Online Application form. Paper applications are not accepted.
   - **Masters Applicants:** Choose "M.S. Informatics" and your intended program (either Bioinformatics, Health Informatics, Human-Computer Interaction or Media Arts and Science) in the "Academic Interest" section.
   - **Ph.D. Applicants:** Choose "Ph.D. Informatics" and "Informatics" in the "Academic Interest" section.
2. Submit a resume listing your education, work, research, honors/awards and computer programming experience. This may be attached to your online application or sent separately.
3. Submit a personal statement (visit the IU Writing Center for instructions on how to write such a statement). Your personal statement should indicate the following:
   - Why you're applying to the program.
   - Your post-graduation career plans
   - **Ph.D. Applicants ONLY:** Note on your statement your intended area of specialization (Bioinformatics, Health Informatics or Human-Computer Interaction).
4. Submit all official transcripts from previous colleges and universities. A helpful transcript request form is available for your use. **NOTE:** we do not require transcripts from Indiana University campuses.
5. Submit three letters of recommendation from academic instructors and/or employers. At least two of the letters should be from faculty with full-time

academic standing from the institute of your most recent degree.

6. Complete the Graduate Record Examination (GRE) and ensure that IUPUI receives your score report from the GRE exam board (when applying for financial support). The Informatics school code for the GRE is 1325 – enter this code on the exam's answer sheets.
    - **Masters Applicants:** You do not need to take or submit a GRE score unless seeking direct financial assistance such as a university fellowship. A GRE score is not required to submit your FAFSA (Free Application for Federal Student Aid) or to seek other federal or private financial assistance opportunities.
    - **Ph.D. Applicants:** You MUST submit an official GRE score from within the past five years.
7. Submit English language proficiency exam score (International and non-native English speaking students only – see instructions below).
8. Pay the $60 application fee.

Special Instructions for International Students and Non-native English Speakers

If your native language is not English, submit with your application one of the following official test scores from within the past two years:

- Test of English as a Foreign Language (TOEFL)
    - **Minimum required scores:** 250 for the computer-based test, 600 for the paper test and 79 for the Internet-based test.
- International English Language Testing System (IELTS)
    - **Minimum required score:** 6

Use IUPUI School Code 1325 to ensure correct routing of your score to IUPUI.

A TOEFL or IELTS may be waived if a B.S. or M.S. degree has been earned in the United States or another native English-speaking country. Alternatives to the TOEFL or IELTS are available.

Bioinformatics Requirements

To receive a Master of Science degree in Bioinformatics, the applicant must be admitted as a graduate student and complete 36 credit hours including: 18 credit hours in bioinformatics core courses, 3 credit hours in seminar courses, and 9 – 15 credit hours of electives. The students have the options of taking (1) six credit hours towards a thesis, or (2) three credit hours towards a project, or (3) a non thesis/project option without thesis/project credit hours.

- INFO-I 501 Introduction to Informatics
- INFO-I 519 Introduction to Bioinformatics
- INFO-I 556 Biological Database Management
- CSCI 59000 Algorithm in Bioinformatics
- INFO-I 575 Informatics Research Design

Advanced Core Courses (12 credit hours, select four)

INFO-I 529 Machine Learning in Bioinformatics(3 cr.) GRAD 652 Biostatistics II (3 cr.) or NURS-N 607 Advanced Statistics (3 cr.) INFO-I 619 Structural Bioinformatics (3 cr.) INFO-I 646 Computational Systems Biology (3 cr.) INFO-I 656 Translational Bioinformatics Applications (3 cr.)

Required Seminar Courses (3 credit hours)

INFO-I 532 Seminar in Bioinformatics

Electives

You may take other INFO graduate courses such as next generation sequencing (I590) and independent study (INFO-I 552), as electives. You may also take up to six credits outside the School of Informatics, in addition to CSCI 59000, GRAD-G 652 and NURS-N 607.

Project/Thesis (6 cr.)

INFO-I 692 Bioinformatics Project (3 cr.) INFO-I 692 Bioinformatics Thesis (6 cr.)

Students may perform an independent research project and produce a report or thesis for public defense. The project might consist of a research paper, a designed artifact, or other appropriate deliverable format.

Certificate Programs

Graduate Certificate in Clinical Informatics

Electronic medical records, digital imaging and sophisticated diagnostic systems are changing how we provide patient-centered care. Healthcare professionals who can effectively utilize these emerging technologies are invaluable. The Graduate Certificate in Clinical Informatics is designed to provide practicing healthcare professionals the education and training necessary to excel in the 21^{S} century.

Certificate Program Requirements

Applications must be credentialed as a physician, a nurse, or other healthcare professional and hold a minimum of a bachelor's degree from an accredited four-year collegiate institution. Students must complete a minimum of 18 credit hours within three years. Fifteen credit hours may be taken through distance education. The curriculum includes two core courses, three specialization courses and a practicum. Courses include:

Core courses (6 cr.)

- INFO I535: Clinical Information Systems
- INFO I581: Health Informatics Standards and Terminology

Specialization courses (9 cr. - select three of the following)

- INFO I505: Informatics Project Management
- INFO I512: Scientific and Clinical Data Management
- INFO I530: Foundations of Health Informatics
- INFO I578: Data Analysis
- NURS I635: Consumer Health Informatics
- INFO I641: Business of Health Informatics
- INFO I643: Natural Language Processing
- INFO I667: Seminar in Health Informatics

Clinical Informatics Practicum - Required (3 cr.)
A maximum of three credits for equivalent courses from other programs may transfer.

Degree Requirements
To receive the Master of Science in Health Informatics, students must complete 36 credit hours of prescribed courses. In addition to core courses, students choose, in consultation with advisors, a set of concentration electives. Examples of concentration areas include 1) knowledge-based health care information, 2) health services informatics, and 3) clinical databases.

Knowledge-based health care information focuses on the storage, organization, evaluation, and dissemination of health and medical knowledge (e.g., textbooks, journals, other media, and information) to support evidence-based practice and patient education. End-users of knowledge-based health care information include clinicians, patients, health educators, and health planners.

Health services informatics focuses on information management in health care systems and addresses such diverse needs as patient flow, resource allocation, billing, and compiling and reporting of data. This involves developing information systems for processing and storing clinical data, complying with medical documentation requirements of accrediting and governmental agencies, and setting health information policies.

Clinical databases focuses on the storage of medical data and linkage of electronic systems. Study in this concentration is based on an electronic medical record system, which includes existing standards and coding, links between health-related databases, and data extraction for clinical care and management. Research is oriented to using such databases to learn more about disease and health maintenance (e.g., clinical epidemiology, pharmacoepidemiology, public health informatics, and nursing informatics).

Prerequisites
All students applying for the M.S. in Health Informatics should have prerequisite courses or equivalencies in the following areas:

Anatomy, Biology, or Physiology (200 level or higher); Computer Science; Medical Terminology; Statistics

NOTE: Remediated courses are available through the School of Informatics:

Clinical Care for Health Informaticians

Web Database Concepts

To receive a Master of Science degree in Health Informatics, the applicant must be admitted as a graduate student and complete 36 credit hours including: 18 credit hours in informatics core courses, 3 credit hours in seminar courses and 9- 12 credit hours of electives. The students have the option of taking 6 credit hours towards a thesis project or 3 credit hours towards a Capstone Project.

Informatics Core Courses (18 credit hours)
- INFO I501: Introduction to Informatics
- INFO I511: Laboratory Information Management Systems
- INFO I530: Foundations of Health Informatics
- INFO I535: Clinical Information Systems
- INFO I575: Informatics Research Design*
- INFO I581: Health Informatics Standards and Terminology
- GRAD G651: Introduction to Biostatistics

Required Seminar Courses (3 credit hours)
- INFO I530: Seminar in Health Informatics I

Sample Electives (9 - 12 credit hours)
- INFO I503: Social Aspects of Information Technology
- INFO I505: Informatics Project Management
- INFO I512: Scientific Data Management
- INFO I578: Data Analysis for Clinical and Administrative Decision Making
- NURS I635: Consumer Health Informatics
- INFO I643: Natural Language Processing
- INFO I642: Clinical Decision Systems
- INFO I641: Business of Health Informatics

Thesis/Capstone Project (3 - 6 credit hours)
- INFO I691: Health Informatics Project (3 cr.)
- INFO I691: Thesis (6 cr.)

NOTE: *Students planning to take INFO 691 project option must take INFO 505 instead of INFO 575

Project/Thesis (6 cr.)
As a capstone experience, students will complete either a project, planned in conjunction with their advisor, or a researched-based thesis, supervised by a research advisor and a thesis committee. Core and support faculty from the participating schools will have a wide range of research interests that will provide graduate students with choices relevant to their concentration areas.

GRADUATE PROGRAMS IN HUMAN COMPUTER-INTERACTION

Graduate Certificate in Human Computer-Interaction (15 cr.)

The Informatics Graduate Certificate Program in Human-Computer Interaction (HCI) is a 15 credit hour program that focuses on the core theory and best practice of the discipline. Admission requirements and procedures are the same as those established for the Human-Computer Interaction Program master's degree. Specifically, students will be required to submit an application through the graduate school and receive a full review by the Informatics Graduate Admissions Committee, i.e., the review will take place for both master's and certificate seeking applicants. Moreover, certificate seeking applicants will need to submit the same documentation and meet the same criteria as master's seeking students, e.g., undergraduate GPA scores and references letters. GREs are not required for either, unless a student is seeking financial assistance from the school or university. See the description of the field of HCI below under the section titled: Master of Science in Human-Computer Interaction.

HCI Core Courses (6 cr.)

- INFO-I 557 HCI Design 1 (Old #: I541)
- INFO-I 558 HCI Design 2 (Old #: I561)

Specialization Requirements (9 cr.)

- INFO-I 563 Psychology of HCI
- INFO-I 555 Usability and Evaluative Methods in Interactive Design (Old #: I543)
- INFO-I 564 Prototyping for Interactive Systems

Master of Science in Human-Computer Interaction (36 cr.)

Human-Computer Interaction (HCI) is a branch of informatics that studies and supports the design, development, and implementation of humanly usable and socially acceptable information technologies. The goal of the field is to shape interactive tools that support human use, augment human learning, enhance communication, and lead to more acceptable technological developments at the individual and social levels. Research in HCI draws extensively on mainstream informatics concerns with cognition, communication, representation, and computation. HCI professionals seek to identify the nature and parameters of human information processing, design and test forms of representation that support human interpretation and use of information (reliably and validly assess new technologies for usability and acceptability), and determine how information technologies change working practices and social activities. [Regular job postings for HCI personnel express a desire for professionals with suitable training in design and evaluation of interactive systems, as well as applied social scientists with technological skills.]

Prerequisites

Students may be asked to complete prerequisite course work by a graduate advisor to ensure progress through the program.

Degree Requirements

To receive the master of science degree, the applicant must be admitted as a graduate student and complete 36 credits of graduate study in HCI according to the following schedule:

Core Courses (21 cr.)

- INFO I501 Introduction to Informatics
- INFO I557 Human Computer Interaction Design 1
- INFO I558 Human Computer Interaction Design 2
- INFO I555 Usability and Evaluative Methods
- INFO I563 Psychology of HCI
- INFO I564 Prototyping for Interactive Systems

Recommended Electives (9 cr.)

Although students are free to select those elective courses most relevant to their particular academic and professional interests, they are also encouraged to seek consultation from their graduate advisor. Prior approval for selection of elective is (in most cases) not required from the graduate advisor. The following courses have been approved for use as electives.

Informatics

- I624 HCI Advanced Seminar I
- I503 Social Impact of Information Tech
- I505 Informatics Project Management
- I510 Data Acquisition and Lab Automation
- I512 Scientific Data Management
- I535 Clinical Information Systems
- I540 Data Mining for Security
- I554 Independent Study in HCI (1-3 cr)
- I590 Structured Conceptual Design
- I605 Social Foundations of Informatics

Media Arts and Science

- N500 Principles of Digital Arts Production
- N502 Digital Media Motion & Sim. Meth
- N503 Digital Media Appl Design Proc
- N504 Advanced Interactive Design Appl
- N506 Media Arts and Technology Project
- N510 Web Database Concepts
- N501 Foundations of Digital Prod

Psychology and Sociology

- PSY570 Industrial Psychology - Fall, odd yr
- PSY572 Organizational Psych – Spg, even yr
- PSY615 Physiological Psych - Fall, even yr
- PSY640 Social Psychology I - Fall, odd yr
- PSY655 Cog Development - Fall, even yr
- SOC–R 556 Advanced Sociological Theory I
- SOC–R 557 Advanced Sociological Theory II
- SOC–R 559 Intermediate Sociological Statistics
- SOC–R 593 Applied Fieldwork for Sociologists
- SOC–S 530 Introduction to Social Psychology

Computer Science

- CSCI 503 Operating Systems
- CSCI 504 Concepts in Computer Organ
- CSCI 507 Object-Oriented Design & Prog
- CSCI 536 Data Comm. & Computer Netw
- CSCI 537 Intro to Distributed Computing
- CSCI 541 Database Systems
- CSCI 550 Computer Graphics
- CSCI 552 Advanced Graphics and Visualization
- CSCI 565 Programming Language

Design

- HER–V501 Design Thinking (1.5 cr.)
- HER–V502 Human Factors in Design (1.5 cr.)
- HER–R511 Visual Research (3 CR)

Communication

- COMM-C 500 Advanced Comm Theory
- COMM–C 531 Media Theory and Criticism
- COMM–C 592 Advanced Health Communication
- COMM–C 620 Computer-Mediated Communication

Geography and Others

- GEOG–G 536 Advanced Remote Sensing
- GEOG–G 537 Computer Cartography and Graphics
- GEOG–G 538 Intro to Geographic Information Systems
- GEOG–G 539 Advanced Geographic Information Systems
- ANTH 501 Fundamentals of Applied Anthropology
- ED 531 Computers in Education

- SLIS-S 532 INFO Architecture for the Web

Research Methods Courses

- ANTH-E404 Field Meth in Ethnography
- COM 501 Qualitative Research
- COM 502 Applied Qualitative Research Methods
- EDU 520 Strategies for Educational Inquiry
- EDU 611 Qualitative Inquiry in Education
- NURS-L 650 Data Ana for Clinical & Admin Decis-Making
- NURS-R 612 Interpretive Data Analysis (2 Cr.), Summer I-II
- PSY 600 Statistical Inference (Fall Even Yr)
- PSY 601 Experimental Design (Spg Even Yr)
- PSY 608 Measurement Theory and Interpret Data
- PSY 640 Survey of Social Psychology I
- PSY 655 Cognitive Development (Fall Even Yr)
- PSY-I 643 Field Methods & Exper
- SOC-R 551 Quantitative Methods – Sociology
- SOC-R 551 Quantitative Methods Sociology
- SOC-R 559 Intermediate Soc Statistics
- STAT 511 Statistical Methods 1
- STAT 512 Applied Regression Analysis
- STAT 516 Basic Probability Appl
- STAT 519 Intro to Probability
- STAT 521 Statistical Computing
- STAT-522 Sampling and Survey Techniques
- STAT 524 Applied Multivariate Analysis
- STAT 525 Intermediate Stat Methodology
- STAT 529 Applied Dec Theory and Bayesian Stat
- STAT 619 Probability Theory
-

HCI Final Project (6 cr.)

Required Course Titles

- I680 HCI Professional Practice 1 (offered only in the fall semester) (6 cr.)
- I681 HCI Professional Practice 2 (offered only in the spring semester) (6 cr.)

Requirement for all HCI Students

All MS HCI students must complete the final project, with includes two courses: I680 HCI Professional Practice 1 (fall) and I681HCI Professional Practice 2 (spring). Students will register for each course, which includes a formally scheduled class time. Students will work on one final project that extends throughout the two courses, i.e., both fall and spring semesters. Students will receive an official grade at the conclusion of each course, i.e., both fall and spring. Students are encouraged to take on a project that can be realistically finished by the time they complete both courses. Incompletes are NOT be permitted. Students taking the final project option are not required to take I575 (Informatics Research Design), which is reserved primarily for HCI Master's Thesis students and Ph.D. students. However, project students may take I575 as an Elective.

HCI Final Project (6 cr.) (Optional)

Required Course Titles

- I694 HCI Thesis (6 cr.) (Work should be divided between two semester of 3 cr. hrs. each.)

The Thesis option is reserved ONLY for students who clearly plan to pursue a Ph.D. at a later time, along with a strong interest and demonstrated ability to carry out empirical research, as determined by one of the HCI faculty. Students taking the Thesis option must also take I575, Informatics Research Design.

Contact Information

School of Informatics
Informatics and Communications Complex (IT)
535 W. Michigan Street
Indianapolis, IN 46202
(317) 278-4113

informatics.iupui.edu

Graduate Programs

The School of Informatics offers **Master of Science** degrees in:

- Bioinformatics
- Health Informatics
- Human-Computer Interaction
- Media Arts and Science

All Master of Science degrees require 36 credits, including the completion of common graduate core courses.

The School of Informatics also offers a **Doctoral (Ph.D.)** program with specializations in:

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- Health Informatics
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All Ph.D. candidates must meet with their academic and/or research advisor for course selection and plan of study.

Academic Regulations

Academic Regulations

Applicability of Degree Requirements

Students may choose to complete either the specific degree requirements published in the appropriate bulletin at the time of entry into the university or those in the bulletin current at the time of graduation.

Residency Requirements

The campus at which a student is admitted will certify and award the degree.

Intercampus Transfer

Students enrolled in the School of Informatics at any campus of Indiana University may transfer to the School of Informatics on another campus, provided they are in good standing. However, international students may need to pay a processing fee.

Transfer of Credit

A maximum of 8 credit hours of graduate course work with grades of B (3.0) or higher may be transferred from other accredited colleges and universities and applied to the School of Informatics degree programs. The transfer must be approved by the dean, and is not an automatic occurrence.

Revalidation

Normally, a course may not be counted toward degree requirements if it has been completed more than five years prior to the awarding of the degree for master's students. The advisor may recommend to the dean that course work taken prior to the deadline be revalidated if it can be demonstrated that the knowledge contained in the course(s) remains current. Currency of knowledge may be demonstrated by: (a) passing an examination specifically on the material covered by the course; (b) passing a more advanced course in the same subject area; (c) passing a comprehensive examination in which the student demonstrates substantial knowledge of the content of the course; or (d) publishing scholarly research demonstrating knowledge of the content of the course. Courses taken while an undergraduate and counted toward the requirements of a baccalaureate degree may not also be counted toward a graduate degree.

Grading System

The official grading system is as follows:

A	= 4.0	D+	= 1.3
A–	= 3.7	D	= 1.0
B+	= 3.3	D–	= 0.7
B	= 3.0	F	= Failed
B–	= 2.7	I	= Incomplete
C+	= 2.3	W	= Withdrawn
C	= 2.0	R	= Deferred
C–	= 1.7	NR	= No grade reported

A minimum of a B (3.0) average in graduate work is required for continuance in graduate study. Courses completed with grades below C (2.0) are not counted toward degree requirements, but such grades will be counted in calculating a student's grade point average. Note that no work may be transferred from another institution unless the grade is B (3.0) or higher.

Incomplete

A grade of Incomplete may be given only if the completed portion of a student's work is of passing quality. It is the responsibility of the student to satisfy the requirements of that course within one calendar year from the date on which the Incomplete is recorded. The student is expected to finish all necessary work in time for the instructor to assign a regular grade before the expiration of this time period. If the student is unable to do so, it is the student's responsibility to notify the instructor of the course and the graduate advisor within the year to request an extension of time. Every overdue Incomplete will be changed to a grade of F after one calendar year.

Withdrawals

Because deadlines for withdrawal from courses may vary by campus and/or school, students should check with the current campus Schedule of Classes to verify deadlines and procedures.

Course Waivers

Requests for waivers of specific courses or requirements on the basis of previous course work are to be submitted in writing to the dean.

Credit Earned in Nondegree Status

Not more than 9 hours of graduate credit completed as a nondegree student may be credited toward a School of Informatics graduate degree. Deficiency courses do not apply to the 9 credit hours.

Academic Standing

Students are considered to be in good standing during any semester in which their academic grade point average is at least 3.0 (B) for both their last semester's course work and for the cumulative average of all course work completed. Only courses with grades of C (2.0) or above may be counted toward degree requirements. However, grades below C are used in computing the cumulative grade point average, even if a course is repeated and a higher grade is earned.

Academic Probation

Students are placed on probation following a semester in which their graduate cumulative or semester grade point average falls below 3.0. Students on probation are required to attain an average of at least 3.0 for all graduate course work completed by the end of the next semester of full-time enrollment or its equivalent (9 credit hours). Failure to do so is cause for dismissal.

Academic Integrity

Academic integrity requires that students take credit only for their own ideas and efforts. Misconduct, including cheating, fabrication, plagiarism, interference, or facilitating academic dishonesty, is prohibited because it undermines the bonds of trust and cooperation among members of this community and between us and those who may depend on our knowledge and integrity. Complete details are contained in the Indiana University Code of Student Rights, Responsibilities and Conduct.

Thesis

Depending on particular degree requirements, students will complete either a capstone project or a thesis under the guidance of an advisor. More details are given in the appropriate section for each program.

Degree Conferral

For all students seeking a master's degree, an application for the degree must be filed with the School of Informatics at least 60 days before the date anticipated for degree

conferral. All degree requirements must be completed at least 30 days prior to the date of expected degree conferral, including submission of the bound copies of the master's thesis (if required for degree).

Time Requirements

All requirements for M.S. degrees must be met within five consecutive calendar years from the date of completion of the first credited (i.e., nondeficiency) course.

Admissions

Admission to the Master's Programs

Successful applicants for admission to the master's programs must demonstrate skills and knowledge in an academic field relevant to the particular master's program (e.g., biology for bioinformatics). Promising applicants who have deficiencies may, with faculty help, select courses that will provide instruction to overcome deficiencies and meet admissions requirements. However, the courses will not count toward the total number of credits required for the advanced degree.

- Degree requirement: bachelor's degree with demonstrated technical skills from an accredited college or university.
- Minimum overall grade point average of 3.0 on a 4.0 point scale.
- Three letters of recommendation from individuals in positions to evaluate the applicant's professional promise. Indiana University reserves the right to validate the source of the letters received.
- Scores from the general Graduate Record Examination (GRE), taken within the last five years. Subject tests are recommended if appropriate to the degree.
- Personal statement or sample of creative work.

Each application for admission is carefully evaluated by the admissions committee for the appropriate degree. Applicants to all degree programs must do the following:

1. Submit an application to the School of Informatics, or, if necessary, to the Office of International Affairs.
2. Pay a nonrefundable graduate application fee to Indiana University.
3. Submit three Application Reference Forms completed by individuals familiar with the applicant's activities and potential to succeed in graduate work.
4. Arrange for official transcripts to be sent from all colleges and universities attended by the applicant. Transcripts indicating "issued to student" are not considered official. An official transcript bears the original signature of the registrar and/or original seal of the issuing institution. Transcripts should be mailed directly by a registrar, or given to the applicant by the registrar in a sealed and signed envelope. International applicants should refer to the guidelines outlined in the International Graduate Application for Admission form. If the student has not completed all undergraduate course work at the time of application, the admission decision will be based on information available at the time of application. However, a final transcript showing graduationmust be submitted before enrollment. Students who have taken course work on any Indiana University campus do not need to submit an Indiana University transcript.
5. Submit scores from the Graduate Record Examination (GRE). Only the General Exam is required; however, an appropriate subject exam may be helpful in determining the applicant's potential.
6. The school does not specify minimum scores, preferring instead to use the full information available in the applicant's dossier. The Media Arts and Science program does not require GRE scores. Information concerning these examinations may be obtained from Graduate Record Examinations, Educational Testing Service, CN 6000, Princeton, NJ 08541-6000 (www.gre.org).
7. Students whose native language is not English must submit results of the Test of English as a Foreign Language (TOEFL). The TOEFL is required of all nonnative English speakers. The TOEFL may be waived if a B.S. or M.S. degree has been earned in the United States. Registration information can be requested from TOEFL/TSE Publications, P.O. Box 6154, Princeton, NJ 08541-6154 (www.toefl.org).
8. Submit a personal statement (300-500 words) describing educational background and reasons for pursuing graduate study. In addition, some programs may require a sample of creative work or professional accomplishment, which may include written work, a computer program, multimedia presentation, portfolio, etc. Submitted materials should support the applicant's career intentions and plans. Contact the Office of Student Services for further information.

Application Procedures

Graduate Program

The Master of Science Degrees

Given the rapid and apparently unlimited growth of this new field at all levels of competence, each of the master's degree programs serves students who need education in the use of information technologies to enhance their job performance or employment prospects.

The School of Informatics offers master's degrees in:

- Master of Science in Bioinformatics
- Master of Science in Health Informatics
- Master of Science in Human-Computer Interaction
- Master of Science in Media Arts and Science (see the "Media Arts and Science" section in this bulletin for policies, regulations, and requirements)

All degrees require 36 credits, including the completion of common graduate core courses.

Application Procedures

Students holding a bachelor's degree from an accredited four-year collegiate institution are eligible to apply for admission. Admission is selective. The admission committee evaluates applicants' abilities to succeed academically and their potential to contribute to the program.

The master's degree is designed for students who seek additional professional education in informatics to complement knowledge in such diverse disciplines as

computer science and technology, graphics, visualization, electronic networking and media communication, library and information science, telecommunications, psychology, cognitive science, journalism, medicine, health and nursing, biology, and chemistry. Most graduates of the School of Informatics will emerge as highly sought-after employees in a burgeoning information industry.

The master's degrees are focused on developing specialized skills and knowledge in information and information technology, with particular application to a specific field of study or practice. Each degree is an interdisciplinary endeavor that combines course work and field experiences from a traditional subject area or discipline with intensive study of information and technology. Because these specialized skills are developed and applied differently in these different fields, specific requirements are established for each degree, and have a content-specific rationale.

Application Procedures for U.S. Citizens
Requests for domestic applications should be directed to the School of Informatics.

Completed applications should be sent to:

Graduate Admissions Committee
School of Informatics
IUPUI
535 West Michigan Street
Indianapolis, IN 46202
E-mail: info@informatics.iupui.edu
Web: www.informatics.iupui.edu

Application Procedures for International Students
Requests for international applications should be directed to:

Office of International Affairs
IUPUI
920 West New York Street Room 2126
Indianapolis, IN 46202-5197
Phone: (317) 278-1290
E-mail: oia@iupui.edu
Web: http://international.iupui.edu

Application Deadlines
Applications will not be acted upon until all required documents have been received (including transcripts, letters of recommendation, application fee, GRE scores, and TOEFL scores for all nonnative English speakers). In order to allow time for processing and making financial aid decisions, applicants must meet the following deadlines:

Admission Periods
Fall March 1
Spring October 1

If applying for financial assistance from the school, applications must be received by January 15.

Bioinformatics

Master of Science in Bioinformatics (36 cr.)

Bioinformatics is a pure and applied science dealing with the collection, management, analysis and dissemination of biological data and knowledge, especially with respect to genetics and molecular biology. A Master of Science in Bioinformatics addresses needs for education in this rapidly growing field. This is an interdisciplinary program involving faculty from multiple schools including IU School of Medicine and industrial scientists from Eli Lilly and DowAgroSciences.

The end of the twentieth century saw an explosion of data discovered from living organisms, especially in areas of molecular biology and genetics by next generation sequencing techniques. The goal of bioinformatics is to deal with this flood of data, organize it as comprehensible information, and turn it into useful knowledge. For example, the flow of information from the Human Genome Project will revolutionize medical practice and biological research in this century and enable an understanding of most inherited diseases. Study of the genomic code, coupled with new understanding of its organization, regulation and function in cells, and in development of organisms, is forming the basis for designing new treatments for many diseases and for understanding and modulating health problems associated with aging. Genome information is quickly becoming the basis for designing new drugs. It is also central to the improvement of genomes of economically important crops and animals.

Experienced bioinformaticians are limited in number, while the need for them in industry, academe, and government has grown rapidly. Full understanding and application of this new data requires a large body of intelligent, creative, and experienced scientists with a firm understanding of both computation and biology. There is a current and projected shortage of such people and a pressing need for educational institutions to teach bioinformatics. New directions following the unraveling of the genomic code also point to greatly increased information flow and an increasing scale in the application of computing methods to biosciences.

The School of Informatics collaborates closely with the Center for Computational Biology and Bioinformatics and the Department of Biochemistry in the School of Medicine, the Department of Computer and Information Science in the School of Science, and the Department of Electrical and Computer Engineering in the School of Engineering and Technology. Research and learning opportunities for students abound.

Degree Requirements

The bioinformatics curriculum includes a set of core and elective courses covering concepts and training in bioinformatics, biostatistics, and computer sciences. A primary goal of this curriculum is to provide scientists with a strong foundation in the areas of computation/ informatics and biology, though their primary focus may be in one or the other area. The integration of knowledge from biology, computing, mathematics, and related areas will receive particular emphasis.
Students with different levels of background in biology, computing, and informatics sciences are encouraged to apply. Students with academic deficiencies will address these through individually planned programs of suggested course work. Students will gain experience in the applications of computing methods to biology information by completing course work and nonclassroom original research projects as well as optional thesis.

Prerequisites

Students holding a bachelor's degree in computer science or a related field from an accredited four-year collegiate institution must have completed all or part of the prerequisites courses listed below:

- Genetics and Molecular Biology and Cell Biology or Molecular Biology

Students holding a bachelor's degree in life sciences or a related field from an accredited four-year collegiate institution must have completed all or part of the prerequisites courses listed below:

- Programming in C, C++, or Java
- Programming/Database
- Statistics

To receive a Master of Science degree in Bioinformatics, the applicant must be admitted as a graduate student and complete 36 credit hours including: 18 credit hours in bioinformatics core courses, 3 credit hours in seminar courses, and 9 – 15 credit hours of electives. The students have the options of taking (1) six credit hours towards a thesis, or (2) three credit hours towards a project, or (3) a non thesis/project option without thesis/project credit hours.

- INFO-I 501 Introduction to Informatics
- INFO-I 519 Introduction to Bioinformatics
- INFO-I 556 Biological Database Management
- CSCI 59000 Algorithm in Bioinformatics
- INFO-I 575 Informatics Research Design

Advanced Core Courses (12 credit hours, select four)

- INFO-I 529 Machine Learning in Bioinformatics(3 cr.)
- GRAD 652 Biostatistics II (3 cr.) or NURS-N 607 Advanced Statistics (3 cr.)
- INFO-I 619 Structural Bioinformatics (3 cr.)
- INFO-I 646 Computational Systems Biology (3 cr.)
- INFO-I 656 Translational Bioinformatics Applications (3 cr.)

Required Seminar Courses (3 credit hours)

- INFO-I 532 Seminar in Bioinformatics

Electives

You may take other INFO graduate courses such as next generation sequencing (I590) and independent study (INFO-I 552), as electives. You may also take up to six credits outside the School of Informatics, in addition to CSCI 59000, GRAD-G 652 and NURS-N 607.

Project/Thesis (6 cr.)

- INFO-I 692 Bioinformatics Project (3 cr.)
- INFO-I 692 Bioinformatics Thesis (6 cr.)

Students may perform an independent research project and produce a report or thesis for public defense. The project might consist of a research paper, a designed artifact, or other appropriate deliverable format.

Financial Assistance

Graduate Assistantships

Students may compete for a limited number of graduate assistantship appointments. Assistantships are awarded solely on the basis of merit. These appointments constitute the most common type of financial assistance offered through the School of Informatics. Graduate assistantships include a stipend and a fee scholarship. Students will be assigned to work in areas supporting the mission of the School of Informatics. Students applying for admission to the program should complete the financial aid form if they wish to be considered for a graduate assistantship. GRE scores are required if applying for financial support from the school.

Fellowships and Scholarships

Although the majority of financial aid is in the form of assistantships, a limited number of fellowships and scholarships are also available. Those receiving fellowships and scholarships are not required to perform any duties in return for the stipend the first year. The second year of support will require research or teaching. These awards are also made solely on a merit basis. Students applying for admission to the program are considered for fellowships and scholarships; there is no additional application to complete. Awards are normally granted for an academic year.

Grants

The GradGrants Center (GGC) is a free service available to all enrolled graduate students on all campuses of Indiana University. The GGC provides information and training to assist graduate students in their search for funding to further graduate study at Indiana University. The IUPUI center is located in the Union Building, room 207; (317) 274-4023.

Loans

Domestic students who need financial assistance not provided by any of the awards already mentioned are eligible to apply for need-based financial aid. For graduate students, most need-based aid is in the form of student loans. For further information, contact the Office of Student Financial Assistance, (317) 274-4162.

Health Informatics

The School of Informatics offers a Master of Science in Health Informatics to address needs arising from the rapidly changing health care environment. Research and educational programs in medical, nursing, and health informatics are growing at a rapid rate nationally. This can be attributed in large part to the increasing complexity and importance of health care reimbursement, which has created a need for improved classification, storage, and analysis of medical information to establish the best clinical practice and cost efficiency.

Users of health informatics include clinicians, researchers, health care educators, health organization administrators, health policy analysts, health information administrators, quality improvement directors, and chief information officers. Those who are professionally involved in health informatics work in a variety of settings, including acute care hospitals, managed care organizations, consulting firms, claims and reimbursement organizations, accounting firms, home health care agencies, long-term care facilities, corrections facilities, pharmaceutical companies, behavioral health organizations, insurance

companies, state and federal health care agencies, and health computing industries.

Informatics is uniquely suited to conduct graduate education in health informatics through its health schools, research centers, and affiliated academic units. The School of Medicine has a long history of fellowship training and research in medical informatics. The School of Nursing, which is the largest in the country, is in the forefront in the development of nursing informatics, with a particular emphasis on consumer health informatics. The School of Library and Information Science offers master's and doctoral degrees in information science, which are distinguished by their sociotechnical orientation.

The school also has a broad research thrust exploring the interconnection of social, behavioral, and technological issues associated with the use of information and communication technologies. Faculty in the department is externally funded to conduct research in medical informatics and bioinformatics. Other academic programs in public health, applied health sciences, and hospital administration offer important supporting course work.

Degree Requirements

To receive the Master of Science in Health Informatics, students must complete 36 credit hours of prescribed courses. In addition to core courses, students choose, in consultation with advisors, a set of concentration electives. Examples of concentration areas include 1) knowledge-based health care information, 2) health services informatics, and 3) clinical databases.

Knowledge-based health care information focuses on the storage, organization, evaluation, and dissemination of health and medical knowledge (e.g., textbooks, journals, other media, and information) to support evidence-based practice and patient education. End-users of knowledge-based health care information include clinicians, patients, health educators, and health planners.

Health services informatics focuses on information management in health care systems and addresses such diverse needs as patient flow, resource allocation, billing, and compiling and reporting of data. This involves developing information systems for processing and storing clinical data, complying with medical documentation requirements of accrediting and governmental agencies, and setting health information policies.

Clinical databases focuses on the storage of medical data and linkage of electronic systems. Study in this concentration is based on an electronic medical record system, which includes existing standards and coding, links between health-related databases, and data extraction for clinical care and management. Research is oriented to using such databases to learn more about disease and health maintenance (e.g., clinical epidemiology, pharmacoepidemiology, public health informatics, and nursing informatics).

Prerequisites

All students applying for the M.S. in Health Informatics should have prerequisite courses or equivalencies in the following areas:

Anatomy, biology, or physiology (200 level or higher); Computer Science; Medical Terminology; Statistics

NOTE: Remediated courses are available through the School of Informatics:

Clinical Care for Health Informaticians

Web Database Concepts

To receive a Master of Science degree in Health Informatics, the applicant must be admitted as a graduate student and complete 36 credit hours including: 18 credit hours in informatics core courses, 3 credit hours in seminar courses and 9- 12 credit hours of electives. The students have the option of taking 6 credit hours towards a thesis project or 3 credit hours towards a Capstone Project.

Informatics Core Courses (18 credit hours)

- INFO I501: Introduction to Informatics
- INFO I511: Laboratory Information Management Systems
- INFO I530: Foundations of Health Informatics
- INFO I535: Clinical Information Systems
- INFO I575: Informatics Research Design*
- INFO I581: Health Informatics Standards and Terminology
- GRAD G651: Introduction to Biostatistics

Required Seminar Courses (3 credit hours)

- INFO I530: Seminar in Health Informatics I

Sample Electives (9 - 12 credit hours)

- INFO I503: Social Aspects of Information Technology
- INFO I505: Informatics Project Management
- INFO I512: Scientific Data Management
- INFO I578: Data Analysis for Clinical and Administrative Decision Making
- NURS I635: Consumer Health Informatics
- INFO I643: Natural Language Processing
- INFO I642: Clinical Decision Systems
- INFO I641: Business of Health Informatics

Thesis/Capstone Project (3 - 6 credit hours)

- INFO I691: Health Informatics Project (3 cr.)
- INFO I691: Thesis (6 cr.)

NOTE: *Students planning to take INFO 691 project option must take INFO 505 instead of INFO 575

Project/Thesis (6 cr.)

As a capstone experience, students will complete either a project, planned in conjunction with their advisor, or a researched-based thesis, supervised by a research advisor and a thesis committee. Core and support faculty from the participating schools will have a wide range of research interests that will provide graduate students with choices relevant to their concentration areas.

Human-Computer Interaction

Human-Computer Interaction (HCI) is the branch of informatics that studies and supports the design, development, and implementation of humanly usable

and socially acceptable information technologies. The goal of the field is to shape new media and tools that will support human use, augment human learning, enhance communication, and lead to more acceptable technological developments at the individual and social levels.

Research in HCI draws extensively on mainstream informatics concerns with cognition, communication, representation, and computation. HCI professionals seek to identify the nature and parameters of human information processing at the interface, design forms of representation that support human interpretation and use of information; reliably and validly test new technologies for usability and acceptability, and determine how information technologies change working practices and social activities.

Regular job postings for HCI personnel express a desire for professionals with suitable training in design and evaluation, and increasingly, applied social scientists with technological skills are finding employment in industry as HCI professionals.

Prerequisites

Students may be asked to complete prerequisite course work by a graduate advisor to ensure progress through the program.

Degree Requirements

To receive the master of science degree, the applicant must be admitted as a graduate student and complete 36 credits of graduate study in HCI according to the following schedule:

Core Courses (21 cr.)

- INFO I501:Introduction to Informatics
- INFO I541: Human Computer Interaction Design I
- INFO I561: Human Computer Interaction Design II
- INFO I543: Usability and Evaluative Methods
- INFO I563: Psychology of HCI
- INFO I564: Prototyping for Interactive Systems
- INFO I575: Informatics Research Design

Recommended Electives (9 cr.)

Electives are to be chosen, with prior approval of a graduate advisor, from a list of departments specific to each degree program. The following courses have been approved. Additional courses may be added to the student's program with advisor's consent.

- INFO I503: Social Impact of Information Technologies
- INFO I505: Informatics Project Management
- INFO I534: Seminar in Human-Computer Interaction
- INFO I550: Legal and Business Issues in Informatics
- INFO I554: Independent Study in Human-Computer Interaction
- INFO I590: Topics in Informatics
- NEWM N500: Principles of Digital Arts Production
- NEWM N503: Digital Media Application Design Processes
- NEWM N510: Web Database Concepts

OR, from the Herron School of Art and Design, School of Library and Information Science, or from the Department of Computer Science. Visit the informatics website for specific suggestions.

Project/Thesis (6 cr.)

Students will perform an independent research project, and produce a report or thesis, a designed artifact, or other appropriate deliverable format for public defense.

Media Arts and Science

Master of Science in Media Arts and Science

The M.S. in Media Arts and Science is an applied program emphasizing integrated digital media communication skills and expertise. In addition to a set of Core media classes, the program can be customized with study in other fields, including media production, design thinking and usability analysis, psychology, communication theory, information management, and computing. A year-long, six-credit project or thesis is required.

Completion of 36 credit hours is required, with 9 hours of Core classes, 6 hours of project or thesis work, and 21 hours of electives. All courses are at the 500-level and above. Students are expected to take the Core classes as early as possible in their course of study.

Full-time students can complete the program in two years. Part-time study is possible. The program accommodates working professionals with many evening courses and a flexible timetable for degree completion.

Admission

Applications for admission are submitted directly to the School. An applicant to the graduate program must have a four-year bachelor's degree, with a GPA of at least 3.0 on a 4.0 scale.

In the general case, applicants to the MAS program are expected to have at least some prior experience in creating digital media. A portfolio documenting prior work and/or expertise is required as part of the application. The portfolio can be supplied on a CD/DVD or through a link to a Web site.

Applicants without a portfolio in digital media are also welcome to apply. In this case, other evidence of accomplishment -- such as an essay, short story, or research paper -- may be submitted as the portfolio. Applications without such evidence of accomplishment will be considered incomplete and will not be reviewed.

Please see the School's web site (informatics.iupui.edu) for full details on the applications process, deadlines, and a link to the on-line application.

Degree Requirements

Completion of 36 credit hours is required, with 9 hours of Core classes, 6 hours of project or thesis work, and 21 hours of electives.

Core (9 cr.)

- NEWM N500 Principles of Multimedia Technology (3 cr., Fall semester)
- NEWM N501 Foundations of Digital Production (3 cr., Spring semester)

- NEWM N503 Digital Media Application Design Processes (3 cr., Spring semester)

Project or Thesis (6 cr.)

- NEWM N506 Project/Thesis (3 cr.) Taken twice, in your last two semesters.

Electives (21 cr.)

- School of Informatics, Media Arts and Science Program
- NEWM N502 Digital Media Motion and Simulation Methods
- NEWM N504 Advanced Interactive Design Applications
- NEWM N505 Internship in Media Arts
- NEWM N510 Web Database Concepts
- NEWM N553 Independent Study (1-3 cr.), can be repeated

School of Informatics, Human-Computer Interaction

Note: completion of this set of courses earns the

- INFO I541 Interaction Design Practice
- INFO I561 Meaning and Form in HCI
- INFO I543 Usability and Evaluative Methods
- INFO I563 Psychology of HCI
- INFO I564 Prototyping for Interactive Systems

School of Informatics, Informatics

- INFO I501 Introduction to Informatics
- INFO I505 Informatics Project Management
- INFO I503 Social Impact of Information Technologies
- INFO I512 Scientific and Clinical Data Management
- INFO I550 Legal and Business Issues in Informatics
- INFO I575 Informatics Research Design
- INFO I590 Topics in Informatics, can be repeated
- INFO I600 Professionalism and Pedagogy in Informatics
- INFO I605 Social Foundations of Informatics

Herron School of Art, Dept of Visual Communication

- HER V501 Intro to Design Thinking
- HER V502 Intro to Human Factors in Design
- HER V511 People-Centered Design Research
- HER V521 Design Analysis
- HER V531 Design Synthesis
- HER V541 Design Evaluation
- HER R511 Studio: Designing Integrated Experiences 1
- HER R512 Studio: Designing Integrated Experiences 2

School of Liberal Arts, Dept of Communication Studies, Applied Communication Program

- COMM C500 Advanced Communication Theory
- COMM C510 Health Provider-Consumer Communication
- COMM C526 Effective Media Strategies
- COMM C531 Media Theory and Criticism
- COMM C582 Advanced Intercultural Communication
- COMM C620 Computer-Mediated Communication

School of Library & Information Science

- SLIS L503 Organization and Representation of Knowledge & Information
- SLIS L532 Information Architecture for the Web

Degree Programs

Given the rapid and apparently unlimited growth of this new field at all levels of competence, each of the master's degree programs serves students who need education in the use of information technologies to enhance their job performance or employment prospects.

The School of Informatics offers **Master of Science** degrees in:

- Bioinformatics
- Health Informatics
- Human-Computer Interaction
- Media Arts and Science

All Master of Science degrees require 36 credits, including the completion of common graduate core courses.

To learn more about the M.S. degree programs review the following information:

- Academic Regulations
- Admission to the M.S. Program
- Application Procedures
- Financial Assistance

PhD Degree Programs

The Indiana University School of Informatics, the first of its kind in the country, was created as a place where innovative multidisciplinary programs could thrive, a program where students can apply the skills of technology to a range of other fields. For current information and specific requirements, go to the website at http://www.informatics.iupui.edu

All Ph.D. candidates must meet with their academic and/or research advisor for course selection and plan of study.

This program is administered with the approval of Indiana University, Bloomington.

The School of Informatics offers a **Doctoral (Ph.D.)** program with specializations in:

- Bioinformatics
- Health Informatics
- Human-Computer Interaction

Bioinformatics

The Indiana University School of Informatics, the first of its kind in the country, was created as a place where innovative multidisciplinary programs could thrive, a program where students can apply the skills of technology to a range of other fields. For current information and specific requirements, go to the website. All Ph.D. candidates must meet with their academic and/or research advisor for course selection and plan of study. This program is administered with the approval of Indiana University, Bloomington.

Program of Study

Students in the doctoral program will explore the connections among technology, theory, social analysis, and application domains in a diverse and multidisciplinary curriculum. This curriculum will include core courses and seminars in informatics, an information subdiscipline [current subdisciplines are bioinformatics, health informatics, and human-computer interaction; courses in methodology and theory; electives in related disciplines inside and outside of the School leading to a Ph.D. minor; and a dissertation]. In addition, students will be encouraged to pursue internships as part of the elective courses or independent studies of their program.

Ph.D. in Bioinformatics

The Ph.D. in Bioinformatics is a 90 credit hour program that includes:

Description	Credit Hours
Core A courses	15
Core B courses	12
Seminar courses	6
Elective Courses	6
Rotation	6
Minor	9
Dissertation	21-30

Areas of Specialization: Faculty research projects often involve representatives from several different research areas working together to develop innovative and even revolutionary new solutions. While students can expect to concentrate in particular areas, they will also be expected to explore the broader significance of their work as well as ways that their expertise can be leveraged to solve problems outside of their own domains.

Areas of research: Sequence pattern recognition, comparative genomics, structural genomics, fragment assembly in DNA sequencing, systems biology, models of evolution, molecular modeling, drug design, biological database integration, data mining, structural bioinformatics, and biomedical text mining.

Qualifying Examination - Written (Required)

1. The oral examination will take place after the student successfully passes the written exam. Students must pass both the written and the oral exam before passing on to candidacy. Only two attempts to pass the oral examination will be allowed.
2. The oral exam will be based on the student's response to the written exam and any material from the core courses.

All students will take a written qualifying examination that covers the core courses (CORE A and B). The examination will be set by a group of faculty who are familiar with the content of the core courses. Examinations will be offered in August. Examinations must be completed by the beginning of the student's fifth semester in the program but can be completed before that time when the core courses are completed. Students who do not successfully complete the examination can retake the examination a second time in January.

Qualifying Examination - Oral (Required)

Dissertation Proposal (Required)

This is an oral review that covers in-depth knowledge of the student's primary research area and dissertation proposal. The research proposal for dissertation must be approved by the student's research committee. That committee may have the same membership as the program committee or the students may choose different members. The advisor for the dissertation will be a faculty member in the School of Informatics and a member of the Graduate Faculty. At least one of the three members of the committee will be based outside of the school. The student will defend the thesis proposal at a public colloquium in the school. The review should be completed within one-year after passing the Qualifying Examinations.

Dissertation (Required)

A written elaboration of significant original research must be successfully presented to the research committee in a public defense as described in the Graduate School Bulletin.

Health Informatics

The Indiana University School of Informatics, the first of its kind in the country, was created as a place where innovative multidisciplinary programs could thrive, a program where students can apply the skills of technology to a range of other fields. For current information and specific requirements, go to the website. All Ph.D. candidates must meet with their academic and/or research advisor for course selection and plan of study. This program is administered with the approval of Indiana University, Bloomington.

Program of Study

Students in the doctoral program will explore the connections among technology, theory, social analysis, and application domains in a diverse and multidisciplinary curriculum. This curriculum will include core courses and seminars in informatics, an information subdiscipline [current subdisciplines are bioinformatics, health informatics, and human-computer interaction; courses in methodology and theory; electives in related disciplines inside and outside of the School leading to a Ph.D. minor; and a dissertation]. In addition, students will be encouraged to pursue internships as part of the elective courses or independent studies of their program.

The PhD in with specialization in Health Informatics is a 90 credit hour program that includes:

Description	Credit Hours
Core A courses	12
Core B courses	15
Seminar Courses	6
Elective Courses	9
Research Methods	9
Rotation	6
Minor	15
Dissertation	21-30

Areas of Specialization: Faculty research projects often involve representatives from several different research

areas working together to develop innovative and even revolutionary new solutions. While students can expect to concentrate in particular areas, they will also be expected to explore the broader significance of their work as well as ways that their expertise can be leveraged to solve problems outside of their own domains.

Areas of research: electronic medical records, health data exchange, standards and terminology for health data, clinical decision support, consumer health informatics, technology to enhance patient safety, tele-health application development and implementation, cost reimbursement and integrated health information systems. The Health Informatics program has close ties and joint projects with the Veteran Administration Medical Center, Regenstrief Institute, Clarian Health, Methodist Hospital, St. Vincent Hospital, Community Health Network, St. Francis Hospitals, IU School of Medicine, and other local health care systems.

Qualifying Examination - Written (Required)

All students will take a written qualifying examination that covers the core courses (CORE A and B). The examination will be set by a group of faculty who are familiar with the content of the core courses. Examinations will be offered in August. Examinations must be completed by the beginning of the student's fifth semester in the program but can be completed before that time when the core courses are completed. Students who do not successfully complete the examination can retake the examination a second time in January.

Qualifying Examination - Oral (Required)

1. The oral examination will take place after the student successfully passes the written exam. Students must pass both the written and the oral exam before passing on to candidacy. Only two attempts to pass the oral examination will be allowed.
2. The oral exam will be based on the student's response to the written exam and any material from the core courses.

Dissertation Proposal (Required)

This is an oral review that covers in-depth knowledge of the student's primary research area and dissertation proposal. The research proposal for dissertation must be approved by the student's research committee. That committee may have the same membership as the program committee or the students may choose different members. The advisor for the dissertation will be a faculty member in the School of Informatics and a member of the Graduate Faculty. At least one of the three members of the committee will be based outside of the school. The student will defend the thesis proposal at a public colloquium in the school. The review should be completed within one-year after passing the Qualifying Examinations.

Dissertation (Required)

A written elaboration of significant original research must be successfully presented to the research committee in a public defense as described in the Graduate School Bulletin.

Human-Computer Interaction

The Ph.D. in Human-Computer Interaction is a 90 credit hour program that includes:

Description	Credit Hours
Core A courses	18
Core B courses	6
Research Rotations	6
Elective Courses	9-18
Research Methods	9
Seminar 1 and 2	6
Minor	9
Dissertation	1-30

Areas of Specialization: Faculty research projects often involve representatives from several different research areas working together to develop innovative and even revolutionary new solutions. While students can expect to concentrate in particular areas, they will also be expected to explore the broader significance of their work as well as ways that their expertise can be leveraged to solve problems outside of their own domains.

Areas of research: Because HCI is a multidisciplinary discipline, students are encourage to expand the scope of their research to cross-traditional disciplinary boundaries into such areas as: user-centered design, cross-cultural theory and application, related areas within new media such as gaming and virtual reality, computer-mediated communication, usability engineering, health informatics, information visualization, biomedical informatics, android science, social robotics, sensorimotor representation, symbol grounding and symbol emergence, and computational neuroscience, etc.

Minor: All students will be required to have an appropriate minor outside or partially inside the school. Minors will be selected with the advisor’s recommendation. The selected minor should be appropriate to the student’s choice of sub discipline within Informatics. Some appropriate minors would include: Biology, Chemistry, Cognitive Psychology, Computer Science, Media Arts, History and Philosophy of Science, information Science, or Sociology.

In all cases the number of hours to be included in the minor will be consistent with the requirements of the unit granting the minor. Some of the courses included in the minor may also count toward the student’s methodology or other requirements.

HCI PH.D. CORE

Core A - Foundations in HCI (18 credit hours)

- I557 HCI Design 1
- I558 HCI Design 2
- I555 Usability and Eval. Methods in Interactive Design
- I563 Psychology of HCI
- I575 Informatics Research Design
- I624 Advanced Seminar I in HCI

Core B - Foundations of Informatics (18 credit hours)

- I501 Introduction to Informatics
- I600 Professionalism and Pedagogy in Informatics
- I564 Prototyping for Interactive Systems
- I790 Research Rotations (3 credits)

- I790 Research Rotations (3 credits)
- I634 Advanced Seminar II in HCI

Qualifying Examination - Written (Required)

All students will take a written qualifying examination that covers the core courses (CORE A and B). The examination will be set by a group of faculty who are familiar with the content of the core courses. Examinations will be offered in August.Examinations must be taken at the conclusion of the second year, usually in August. Students who do not successfully complete the examination can retake the examination a second time in the following December of the same year.

Qualifying Examination – Oral (Required)

The oral examination will take place after the student successfully passes the written exam. Students must pass both the written and the oral exam before passing on to candidacy. Only two attempts to pass the oral examination will be allowed. The oral exam will be based on the student's response to the written exam and any material from the core courses.

Dissertation Proposal (Required)
This is an oral review that covers in-depth knowledge of the student's primary research area and dissertation proposal. The research proposal for dissertation must be approved by the student's research committee. That committee may have the same membership as the program committee or the students

may choose different members. The advisor for the dissertation will be a faculty member in the School of Informatics and a member of the Graduate Faculty. At least one of the three members of the committee will be based outside of the school. The student will defend the thesis proposal at a public colloquium in the school. The review should be completed within one-year after passing the Qualifying Examinations. The time requirement can change with approval from the student primary advisor.

Dissertation (Required)

A written elaboration of significant original research must be successfully presented to the research committee in a public defense as described in the Graduate School Bulletin.

It is recommended that I790 be divided up into different semesters and under the supervision of different faculty members to support a broader and richer learning experience for the student.

Degree Programs

The School of Informatics offers **Master of Science** degrees in:

- Bioinformatics
- Health Informatics
- Human-Computer Interaction
- Media Arts and Science

All Master of Science degrees require 36 credits, including the completion of common graduate core courses.

The School of Informatics also offers a **Doctoral (Ph.D.)** program with specializations in:

- Bioinformatics
- Health Informatics
- Human-Computer Interaction

All PhD candidates must meet with their academic and/or research advisor for course selection and plan of study.

Master of Science in Media Arts and Science

Upon completion of the MS program, Media Arts and Science students are able to:

1. Design and create digital media products that are targeted to a specific purpose and that meet professional standards for quality.
2. Plan a coordinated collection of multi-media or trans-media communications and/or experiences, using each medium to good advantage.
3. Assess media communications and/or experiences, discriminating among features that influence effectiveness.
4. Recommend strategies, practices, and/or tools appropriate to a problem.
5. Predict future trends and developments in digital media, based on examination of the history, tradition, and current drivers in the field.
6. Communicate in written and oral form to a range of audiences.

Master of Science in Bioinformatics

Upon completion of the MS program, Bioinformatics students are able to:

1. Extract information from different types of bioinformatics data (gene, protein, disease, etc.) including their biological characteristics and relationships.
2. Employ different data representation models and formats used for bioinformatics data representation including markup languages, such as SBML and CellML, and ontologies, such as GO ontology.
3. Apply the different approaches used for data integration and data management, including data warehouse and wrapper approaches.
4. Master computational techniques and diversified bioinformatics tools for processing data including statistical, machine learning and data mining techniques.
5. Analyze processed data in particular with the support of analytical and visualization tools.
6. Carry out bioinformatics research under advisement including systems biology, structural bioinformatics and proteomics.
7. Interact with non-bioinformatics professionals, such as biologists and biomedical researchers in order to better understand their bioinformatics needs for better support and service delivery.
8. Design and develop bioinformatics solutions by adapting existing tools, designing new ones, or a combination of both.

Master of Science in Health Informatics

Students will master health informatics knowledge and skills, as well as acquiring practical experience, in three domains:

1. Understanding technology and methodologies for processing data, information and knowledge in Health Care
    - Explain concepts of information and communication technologies.
    - Elaborate basic informatics terminology like data, information, knowledge, hardware, software, networks, information systems, information systems management, databases.
    - Execute queries on large databases using data mining and testing hypothesis approaches.
    - Integrate data from disparate systems found in hospitals and clinics.
    - Implement standards and terminologies for documenting health events and exchanging protected health information.
2. Information Literacy for Health Care
    - Determine the nature and extent of the information needed.
    - Access needed information effectively and efficiently.
    - Evaluate information and its sources critically and incorporates selected information into his or her knowledge base and value system.
    - Individually or as a member of a group, use information effectively to accomplish a specific health care purpose.
    - Propose/justify Decision Support Systems algorithm to support care delivery.
    - Integrate Natural Language Processing (NLP) with standards and terminologies used in health care
    - Evaluate outcomes of the use of information in clinical practice.
3. Information Management
    - Verbalize the importance of Health Information Systems to clinical practice.
    - Have knowledge of various types of Health Information Systems and their clinical and administrative uses.
    - Assure confidentiality of protected patient health information when using Health Information Systems.
    - Assure access control in the use of Health Information Systems.
    - Assure the security of Health Information Systems.
    - Estimate the Return of Investment (ROI) of health information technology applications for health care.
    - Possess the skills as outlined in direct care component of the HL7 EHRS model, which such as navigation, Decision Support, output reports and more.
    - Understand the principles upon which organizational and professional Health Information System for providers and consumers are based.

Master of Science in Human-Computer Interaction

Students completing an HCI master's degree will define, explain and apply with considerable depth:

1. HCI theory and usability terms, principles, and practices
    - Problem space definition and conceptual models
    - Social mechanisms used in communication
    - User-centered approaches to interaction design
    - User profiling and user needs and requirements
    - Interface design principles and processes
    - Cognitive and information processing
    - Product assessments related to a market analysis
    - Processes and life-cycles of interaction design
    - Interface design and related areas of visual design and aesthetics
    - Product evaluation and testing methods, both qualitative and quantitative
2. Related to the design and evaluation of interactive products up to the prototype stage, students will develop and apply HCI principles and practices in the areas of product development and usability testing, including the following acquisition of abilities:
    - Produce interface designs and prototypes based on user and needs assessments.
    - Apply HCI theory, principles, and a user-centered approach to interaction design.
    - Design interactive products up to the prototype.
    - Apply evaluation and usability testing methods to interactive products to validate design decisions.

Doctor of Philosophy in Informatics - General

Upon completion of all PhD programs, students will be able to:

1. Identify, discuss, and apply the fundamental concepts, theory and practices in informatics such as information representation and architecture, retrieval, structured query language, information extraction and integration from disparate data sources, information visualization and security, and data mining including the relevant tools and methodologies.
2. Identify and practice the knowledge of beginning statistics, including sampling and correlations, research paradigms such as constructivism and pragmatism, distinctions and limitations of qualitative, quantitative, and mixed method research designs, understanding validity and reliability.
3. Apply research proposals, conduct peer reviews, create an annotated bibliography, create and present a high-level presentation pertaining to research, and use SPSS.
4. Acquire and apply the ability to read and critique scientific articles by analyzing the problem presented, solutions proposed, and critically looking

at the solutions and the results, as well as learn how organize and write a scientific article through critical thinking and discussion.
5. Write research proposals by examining NSF and NIH case studies, including style and grant specific requirements.
6. Develop and deliver class-room lectures, including processes for critically evaluating class-room lectures and how to prepare effective teaching materials to teach selected topics of interest.
7. Apply research methods and acquire more advanced knowledge in different areas of research through apprenticeship work with the faculty member and other students in that group.

Concentrations will have the above general outcomes plus additional ones.

Certificate in Clinical Informatics

Individuals graduating from this program will be able to lead the successful deployment and use of health IT to achieve transformational improvement in the quality, safety, outcomes, and thus the value, of health services in clinical areas.

1. Understanding technology and methodologies for processing data, information and knowledge in Health Care
   - Explain concepts of information and communication technologies.
   - Integrate data from disparate systems found in hospitals and clinics.
   - Implement standards and terminologies for documenting health events and exchanging protected health information.
2. Information Literacy for Health Care
   - Determine the nature and extent of the information needed.
   - Access needed information effectively and efficiently.
   - Evaluate outcomes of the use of information in clinical practice.
3. Information Management
   - Verbalize the importance of Health Information Systems to clinical practice.
   - Have knowledge of various types of Health Information Systems and their clinical and administrative uses.
   - Assure confidentiality of protected patient health information when using Health Information Systems.
   - Assure access control in the use of Health Information Systems
   - Assure the security of Health Information Systems

Student Learning Outcomes

Master of Science

- Bioinformatics
- Health Informatics
- Human-Computer Interaction
- Media Arts and Science

Doctor of Philosophy

- Bioinformatics
- Health Informatics
- Human-Computer Interaction
- General PhD Learning Outcomes

Graduate Certificate

- Clinical Informatics
- Human-Computer Interaction
- Informatics in Health Information Management and Exchange
- Informatics in Health Information Security
- Informatics in Health Information Systems Architecture
- Informatics for Public Health Professionals

Certificate in Informatics for Public Health Professionals

Individuals graduating from this program will be able to lead the successful deployment and use of health IT to achieve transformational improvement in the quality, safety, outcomes, and thus in the value of public health services.

1. Understanding Technology and Methodologies for processing data, information and knowledge in Health Care
   - Explain concepts of information and communication technologies.
   - Integrate data from disparate systems such as clinical data, surveillance data, etc. for public health decision making.
   - Implement standards and terminologies for documenting public health events and exchanging protected health information for improved surveillance.
2. Information Literacy for Health Care
   - Determine the nature and extent of the information needed for public health decisions.
   - Access needed information effectively and efficiently.
   - Evaluate outcomes of the use of information in public health.
3. Information Management
   - Verbalize the importance of Health Information Systems to public health surveillance.
   - Have knowledge of various types of Health Information Systems and their potential use in public health surveillance.
   - Evaluate when confidentiality of protected patient health information is superseded by public health needs.
   - Assure access control in the use of Health Information Systems for public health needs.
   - Assure the security of Health Information Systems.

Certificate in Informatics in Health Information Systems Architecture

Individuals graduating from this program will be the architects and developers of advanced health IT solutions. These individuals will be cross-trained in IT and health

domains, thereby possessing a high level of familiarity with health domains to complement their technical skills in computer and information science.

1. Understanding Technology and Methodologies for processing data, information and knowledge in Health Care
    - Explain health informatics and health information systems and being able to prepare health information system design and development.
    - Recommend usability and usefulness measures to evaluate health information systems.
    - Discern principles of informatics that govern communication systems, health decisions, information retrieval, telemedicine, bioinformatics and evidence-based medicine as well as ways in which information science and computer technology can enhance evidence based practice in healthcare.
2. Information Literacy for Health Care
    - Inspect solutions for management and mining of data generated in scientific laboratories and clinical trials for data mining and knowledge discovery, which include knowledge discovery techniques and databases, extraction of data/ metadata stored in data warehouses using Storage Area Networks and dealing with issues of handling this data.
    - Design approaches to access needed information effectively and efficiently.
    - Analyze the principles and methodologies underlying most standards for health care data interchange and practical issues of reading and understanding specifications, implementing, and translating between standards.
3. Information Management
    - Analyze theoretical and practical models for the delivery of consumer health information and implement them in the design and development of consumer health information resources.

Certificate Informatics in Health Information Security

Individuals graduating from this program would be qualified to serve as institutional/organizational information privacy or security officers. Knowledge on how to maintain trust by ensuring the privacy and security of health information is an essential component of this program.

1. Understanding Technology and Methodologies for processing data, information and knowledge in Health Care
    - Explain concepts of information and communication technologies.
    - Analyze network service management (i.e. DNS/DHCP, web, email, spam filtering, resource sharing, database, directory services and authentication), network communication and security (i.e. network devices, firewalls, intrusion detection systems, and incident response/forensics), and administration (i.e. shell scripting, documentation/request management, policy and procedure management, data center considerations, and virtualization).
    - Implement standards and terminologies for maintaining privacy and security of protected health information.
2. Information Literacy for Health Care
    - Determine the nature and extent of the privacy and security needed to protect health information.
    - Propose infrastructure needed to safeguard protected health information effectively and efficiently.
    - Evaluate administrative safeguards critically.
    - Evaluate technical safeguards critically.
    - Evaluate physical safeguards critically.
    - Access privacy and security regulations for health care information transactions including policy, procedures, guidelines, security architectures, risk assessments, disaster recovery, and business continuity; particular attention given to the Health Insurance Portability and Accountability Act (HIPAA) and the Health Information Technology for Economic and Clinical Health (HITECH) Act.
3. Information Management
    - Verbalize the importance of health information exchange to health care outcomes.
    - Have knowledge of various types of health information exchange services.
    - Assure confidentiality of protected patient health information when using health information exchange.
    - Assure access control in the use of health information exchange.
    - Assure the security of health information exchange.
    - Possess the skills as outlined in supportive functions component of the HL7 model applicable to health information exchange.
    - Understand the principles upon which organizational and professional Health Information System for providers and consumers are based.

Certificate in Informatics in Health Information Management and Exchange

Individuals graduating from this program will support the collection, management, retrieval, exchange, and/or analysis of information in electronic form, in healthcare and public health organizations.

1. Understanding Technology and Methodologies for processing data, information and knowledge in Health Care
    - Explain concepts of information and communication technologies.
    - Elaborate basic informatics terminology like data, information, knowledge, hardware, software, networks, information systems, information systems management, databases.

- Implement standards and terminologies for documenting health events and exchanging protected health information.

2. Information Literacy for Health Care
   - Determine the nature and extent of the information needed to build effective health information exchange services.
   - Propose infrastructure needed for health information exchange effectively and efficiently.
   - Evaluate information and its sources critically and incorporates selected information into health information exchange services.
   - Evaluate outcomes of health information exchange services on health care outcomes.
3. Information Management
   - Verbalize the importance of health information exchange to health care outcomes.
   - Have knowledge of various types of health information exchange services.
   - Assure confidentiality of protected patient health information when using health information exchange.
   - Assure access control in the use of health information exchange.
   - Assure the security of health information exchange.
   - Possess the skills as outlined in supportive functions component of the HL7 model applicable to health information exchange.
   - Understand the principles upon which organizational and professional Health Information System for providers and consumers are based.

Certificate in Human-Computer Interaction

Students will recognize, explain, and apply with considerable depth human-computer interaction (HCI) knowledge in:

1. Basic HCI theory, terms, principles, and conceptual models
2. User-centered design theory and practices related to interaction design
3. HCI design and development processes and life-cycle
4. User profiling to interaction design (needs and requirements)
5. System requirements and product assessments
6. Interface design principles and processes
7. Product usability evaluations and testing methods
8. The purpose of the graphic user interface
9. Usability theory, terms, and the applied techniques
10. Principles of the interface design and prototyping processes
11. Interface grids and typographical devices
12. Information architecture and content management
13. Classic user testing theory and tools
14. Advanced user requirements and profiling
15. Interface design standards / guidelines for cross cultural and disabled users
16. Interaction design styles and choosing interaction devices and elements
17. Develop an evaluative strategy; planning who, what, when, and where
18. Decide how to collect data and prepare for the final evaluation
19. Analysis and interpretation of the evaluation data
20. Inspect a user interface, including a range of evaluative processes
21. Prototype design basics: theory and practice; including basic terms
22. Psychological and behavioral science of HCI
23. Cognitive architecture, memory, problem-solving, mental models, perception, and action related to HCI
24. Impact the design and testing of interactive technologies

Related to applying HCI theory and principles to product development, students will:

1. Apply HCI principles and a user-centered approach to interaction design
2. Analyze user needs and requirements
3. Design and develop prototypes based on user assessments (needs and requirements), while applying HCI principles and models.
4. Apply evaluation and usability testing methods to interactive products to validate design decisions
5. Develop pre-design and post-design usability testing techniques on the developed Web site
6. Assess user needs and requirements
7. Categorize, design, and develop information in proper architectural structures
8. Create interface design prototypes based on a range of design principles and user data, and user assessments
9. Apply prototype principles and a user-centered approach to interaction design
10. Apply evaluation and usability testing methods to prototypes to validate design decisions and to the Web product to validate design decisions using: a) Classic user testing, and b) Heuristic inspection
11. Analyze test data and write a comprehensive report on the product development process of their redesigned Web site, i.e. of the stages of pre-design, design, and post-design, testing, and data analysis
12. Implement a HCI research proposal, including research questions, collecting the relevant literature and methodology
13. Develop a general framework, with a hierarchy of concepts and topics, including a refinement of the research question
14. Understand and apply the various research methods regarding qualitative and quantitative data

Doctor of Philosophy in Informatics - Bioinformatics

Upon completion of the Bioinformatics PhD program, students will be able to:

1. Analyze different types of bioinformatics data (gene, protein, disease, etc.) including their biological characteristics and relationships.

2. Formulate steps involved in transforming the data to knowledge, as well as introducing different techniques used at each step
3. Impact informatics on other disciplines such as biology from several perspectives including the social and economic aspects.
4. Establish different data representation models and formats used for bioinformatics data representation including markup languages, such as SBML and CellML, and ontologies, such as GO ontology.
5. Master different approaches used for data integration and data management, including data warehouse and wrapper approaches.
6. Develop computational techniques and employ diversified bioinformatics tools for data processing including statistical, machine learning and data mining techniques.
7. Analyze processed data in particular with the support of analytical and visualization tools.
8. Perform bioinformatics research in area of interest.
9. Interact with non-bioinformatics professionals, such as biologists and biomedical researchers in order to better understand their bioinformatics needs for better support and service delivery.
10. Develop the ability to design and develop bioinformatics solutions by adapting existing tools, designing new ones, or a combination of both.

Doctor of Philosophy in Informatics - Health Informatics

Upon completion of the Health Informatics PhD program, students will be able to:

1. Skilled in the analysis, design, and implementation of information systems that support and expand the delivery of health care.
2. Function as translators between clinicians and information technology personnel.
3. Insure that information systems capture and present critical health information.
4. Interact with non-health care professionals, such as computer science, information science, cognitive science, and other researchers in order to better understand how their knowledge advances health informatics science.
5. Demonstrate in-depth knowledge on health informatics research approaches.
6. Propose innovative approaches to the development of health informatics knowledge.

Doctor of Philosophy in Informatics - Human Computer Interaction

Upon completion of the HCI PhD program, students will be able to:

1. Identify and explain HCI domain knowledge in the areas of both basic and applied research with considerable depth, including:
    - HCI theory and usability terms, principles, and practices,
    - Problem space definition and conceptual models,
    - Social mechanisms used in communication,
    - User-centered approaches to interaction design,
    - User profiling and user needs and requirements,
    - Interface design principles and processes, as well as related areas of visual design and aesthetics,
    - Cognitive and information processing,
    - Product assessments related to a market analysis, as well as processes and life-cycles of interaction design, and
    - Product evaluation and testing methods, both qualitative and quantitative
2. Identify and apply HCI principles and practices during product design and evaluate (development and usability testing) of interactive products, including the producing of interface designs and prototypes based on user and needs assessments and a user-centered approach to interaction design and the final analysis, evaluation, and usability testing methods to interactive products to validate design decisions.
3. Identify and explain the broader HCI connections and associations among technology, theory, social analysis, and application domains to arrive at a set of questions in preparation for final research and dissertation, as well as the broader significance of their work within the context of past and current HCI research.

Academic Policies & Procedures

Absences

From Final Examinations Students are required to adhere to the policies regarding final examinations as published in the *Schedule of Classes*.

From Scheduled Classes Illness or equivalent distress is the only acceptable excuse for absence from class. Other absences must be explained to the satisfaction of the instructor, who will decide whether omitted work may be made up.

Credit for Correspondence Courses

With prior approval, the School of Informatics will accept a maximum of two courses (6 credit hours total) by correspondence study to count toward the degree requirements. Only general elective courses may be taken by correspondence. Distance learning courses and courses conducted online are not considered correspondence courses and, therefore, do not have a credit hour limit associated with them.

Degree Application

Candidates for graduation must file an application with the school by March 1 for December graduation and October 1 for May, June, or August graduation. Credits for all course work, except that of the current semester, must be recorded on the candidate's Indiana University transcript at least one month prior to the date of graduation.

Statute of Limitations

Candidates for the bachelor's degree in informatics have the right to complete the degree requirements specified by the bulletin in effect at the time they entered Indiana University, provided that the required courses are

available and that no more than eight calendar years have elapsed since the date of entry.

Grading Policies
The School of Informatics follows the official grading system of Indiana University described in the front of this bulletin.

Pass/Fail
During an undergraduate program, students in the School of Informatics in good standing (not on probation) may enroll in up to a maximum of eight university elective courses to be taken with a grade of P (pass) or F (fail). Students may take up to two Pass/Fail courses during an academic year. The procedure for declaring this option may be found in the Schedule of Classes. A grade of P is not counted in the grade point average; a grade of F is included. Grades of P cannot be changed to any other letter grade.

Probation/Dismissal/Readmission at School of Informatics
Academic Warning
A student whose semester (fall or spring) grade point average (GPA) falls below a 2.0, but whose cumulative GPA is a 2.0 or higher will be placed on academic warning. An advising hold will be placed on the student's record and the student will be required to meet with their academic advisor prior to registration.

Academic Probation
A student whose cumulative grade point average (GPA) falls below a 2.0 will be placed on probation for the subsequent semester. A probation hold will be placed on the student's record and the student will be required to meet with their academic advisor prior to registration. Once the cumulative GPA is 2.0 or higher, the student will be removed from probationary status.

Dismissal
A student on probation who has completed a minimum of 12 IU GPA hours is subject to dismissal if they fail to attain a GPA of at least 2.0 in any two consecutive semesters (fall and spring) and their cumulative IU GPA is below 2.0.

Readmission
Students who are dismissed for the first time must sit out for a minimum of one regular fall or spring semester (not summer) and petition by the established deadlines to be eligible for readmission. Students dismissed two or more times must remain outof school for two regular (fall and spring) semesters and petition by the established deadlines to be eligible for readmission. Readmitted students may only begin in either the fall or spring semester.

Grade Replacement
The Grade Replacement Policy is available only to undergraduate students. It may be exercised for a maximum of 15 credit hours, no more than two times for a given course, with each attempted replacement counting toward the 15 credit hour limit. Any grade may be replaced with the last grade earned for the course, as long as the most recent grade is equal to or higher than the grade being replaced. The replaced grade will then be excluded from the cumulative grade point average. However, the course listing and the replaced grade will remain on the student's academic record with an "X" notation indicating that the grade is excluded from the cumulative grade point average.

The policy became effective beginning with the fall 1996 semester, and any courses being used to replace an earlier grade must have been taken in the fall of 1996 or later. Grades previously granted FX will be honored and will count toward the 15 credit hour limit. Once invoked, a student may not subsequently request reversal of the grade replacement granted for a given course. Also, this policy is not available for graduate students or students seeking any second undergraduate degree. Please see your academic advisor to discuss grade replacement and obtain a form. For more information about the policy, visit http://registrar.iupui.edu/replace.html

Administration, Faculty and Staff

School of Informatics Administration, Faculty, and Staff

Administration

Faiola, Anthony, Ph.D. Purdue University, 2005; M.A., Ohio State University, 1984; M.F.A.,Ohio State University, 1979; M.A., State University New York, 1977; B.F.A., State University New York, 1975; *Executive Associate Dean, Associate Professor, Director of Human Computer Interaction Graduate Program*

Palakal, Mathew J., Ph.D. Computer Science,1987; M.S. Computer Science, 1983; B.S., Computer Science, Concordia University [Canada], 1979, *Associate Dean for Research and Graduate Studies, Director, Informatics Research Institute, and Professor of Informatics*

Hayes, Barbara, M.S., Indiana University, 2001; M.S.W., Indiana University, 1981; B.A., Indiana University, 1976, *Associate Dean for Administration and Planning, Clinical Assistant Professor*

Faculty

Baker, M. Pauline, Ph.D., University of Illinois, 1990; M.S., Western Illinois University, 1981; M.S., Syracuse University, 1977; B.A., Cornell University, 1974, *Associate Professor, Director, Director of the Media Arts and Science Program*

Bolchini, Davide, Ph.D., University of Lugano, 2003; B.A., M.S. University of Lugano 2000, *Assistant Professor*

Chen, Yue (Jake), Ph.D., 2001; M.S., 1997; B.S., University of Minnesota, 1995, *Associate Professor*

Comer, Robert Skipworth, M.S., Indiana University, 2001; B.S., Vanderbilt University, 1978, *Research Associate*

Defazio, Joseph, Ph.D., Indiana University, 2008; M.S., Indiana State University, 1993; B.S., B.A., Indiana State University, 1994, *Associate Professor*

Dunker, A. Keith, Ph.D., 1969, Post-doctorate, Yale University; M.S., University of Wisconsin at Madison, 1967; B.S., University of California, Berkeley, 1965; *Professor and Director, Center for Computational Biology and Informatics*

Hook, Sara A., J.D., 1994; M.B.A., Indiana University, 1988; M.L.S., 1980; B.A., University of Michigan, 1978, *Professor of Informatics*

Huang, Edgar, Ph.D., Indiana University, 1999; M.F.A., University of California, 1995; M.L., People's University of China, 1988; B.A., Institute of International Relations, 1984, *Associate Professor*

Jones, Josette W., Ph.D., University of Wisconsin, 2002; Licentiate Nursing, Brussels, Belgium, 1990; Licentiate Medical Social Sciences, Katholieke Universiteit Leuven, Louvain, Belgium, 1981; Graduate Hospital Nursing, Mater Salvatoris, Hasselt, Belgium, 1973, *Associate Professor, Health Informatics, Associate Professor, Nursing*

Kharrazi, Hadi, Ph.D. Dalhousie University, 2008; M.D., Iran University of Medical Sciences and Health Services, 2003; M.S., Dalhousie University, *Assistant Professor*

Koch, Clinton, M.S., Indiana University, 2000; B.A., Indiana University, 1997, *Lecturer*

MacDorman, Karl, B.A., Ph.D. Unviersity of Cambridge, UK, 1996; University of California, 1988, *Associate Professor*

Mannheimer, Steve, M.F.A., Washington University, 1975; B.F.A., Drake University, 1973; B.A., Grinnell College, 1972, *Professor*

McDaniel, Anna M., D.N.S., 1991; M.A., 1981; B.S.N., Ball State University, 1974, *Professor of Nursing and Health Informatics*

Merchant, Mahesh, Ph.D., University of Utah, 1980; M.S.E.E., California State University, 1976; B.S.E.E., University of Poona, 1973, *Lecturer*

Pfaff, Mark, Ph.D. The Pennsylvania State University, 2008; M.S., Duquesne University, 2001; B. A., Pennsylvania State University, 1995, *Assistant Professor*

Powers, Mathew, M.F.A. Indiana University 2006; B.F.A., Indiana University, 2002, *Lecturer*

Stewart, Jennifer, Media Arts and Science, Master of Science, Indiana University, 2009; B.G.S., Indiana University, 1993, *Lecturer*

Tennant, Felisa, M.I.S., Indiana University, 2001; B.S., Indiana University, 1997, *Clinical Assistant Professor, and Health Information Administration Interim Program Director*

Tennant, Susan, M.S., Indiana University–Purdue University Indianapolis, 2000; B.F.A.,State University New York, 1974; B.A., State University New York, 1973, *Clinical Associate Professor, Assistant Director, Media Arts and Science*

William, Albert, M.S., Indiana University, 2002; B.S., Bowling Green State University, 1984, *Research Associate*

Wu, Huanmei, Ph.D. Northeastern University, 2005; M.S., Northeastern University, 2003; B.S., Tsinghua Universitym 1996, *Assistant Professor*

Zhou, Yaoqi, Post-doctorate, North Carolina State University [1994-95] and Harvard University [1995-2000]; Ph.D. State University of New York, 1990; B.S., University of Science and Technology of China, 1984, *Director of Informatics, Professor of Informatics*

Staff

Barker, Nancy, *Assistant Business Manager*

Benedict, Brian, *Career Services Specialist*

Burzlaff, Linda, *Coordinator of Graduate Student Services*

Coryell, Geoff, *Multimedia Technology Specialist*

Daugherty, Victoria, *Administrative Coordinator*

Edwards, Natalie, *Academic Advisor*

Garrett, Nate, *Web and Database Specialist*

Haggenjos, Beth, *Director of Career Services*

Hostetler, Jeff, *Grant Specialist*

Humes, Olisa, *Administrative Specialist*

Mattingly, Jill, *Academic Advisor*

Marasco, Rosiel, *Director of Fiscal and Administrative Affairs*

Melluck, Kimberly, *Director of Technology and Facilities Planning*

Nelson, Christina, *Academic Advisor*

O'Neill, Mary, *Administrative Specialist*

Phelps, David, *Multimedia Technologist*

Rose, Lisa, *Recorder*

Spangle, Matt, *Computer Support*

Stukey, Teresa, *Human Resources Coordinator*

Tauriainen, David, *Computer Support Specialist*

Ward, Caitlin, *4th floor Receptionist*

Scholarships & Awards

Scholarships

The School of Informatics offers several scholarships in all degree programs. Most scholarships are available only to undergraduate students. Financial assistance for master's students is generally given to a select number of students in the form of a graduate assistantship.

Available to all School of Informatics Students:

The John R. Gibbs Scholarship/Fellowship for Innovation is available to both undergraduate and graduate students in the School of Informatics at IUPUI who have demonstrated or show interest in innovation and entrepreneurship.

Freshman Scholarships:

School of Informatics Freshman Scholarships are awarded to incoming freshmen students who graduated in the top 25% of their class and have received a minimum SAT score of 1070 or ACT of 23. Students must plan to enroll in the Informatics or Media Arts and Science program. The scholarship is renewable for up

to four years with a GPA of 3.2 and continuous full-time enrollment.

The Aspirations in Computing Freshman Scholarship is available to incoming female freshmen for their computing-related achievements and interests. Awardees are selected for their computing and IT aptitude, leadership ability, academic history, and plans for post-secondary education. The scholarship is awarded to the student(s) who won the NCWIT Aspirations in Computing competition and is admitted directly to the School of Informatics at IUPUI. The scholarship is renewable for up to four years with a GPA of 3.5 and continuous full-time enrollment.

Scholarships available to Juniors or Seniors:

The Health Information Technology Scholarship is available to a junior or senior with an interest in health information technology. The scholarship may be given to a student with a strong affinity for working in a health field whether through study of informatics and the health sciences, health information administration, bioinformatics, or media arts and science. Preference will be given to a student demonstrating strong leadership qualities and a desire to pursue further education beyond the undergraduate degree. Recipients are selected in the spring of their sophomore or junior year.

Scholarships available to Seniors:

The David M. Ratts Scholarship is available to senior students in the School who have a record of academic excellence and a minimum GPA of 3.5. Recipients are selected in the spring of their junior year.

The Tyler R. Stull Memorial Scholarship is available to senior students in the School majoring in Media Arts and Science who demonstrate significant talent and future career potential in the area of graphic or sound design, and who have a minimum GPA of 3.0. Preference is given to students who are residents of Indiana and demonstrate financial need. Recipients are selected in the spring of their junior year.

The Dean's Advisory Council Senior Scholarship is available to senior students in the School who have a record of innovation, community service or academic excellence. Recipients are selected in the spring of their junior year.

Scholarships available to Juniors or Seniors in the Health Information Administration (HIA)

Scholarships program:

Gertrude L. Gunn Memorial Fund Scholarship, established in memory of the founder of the program, are awarded to students in HIA. They are based on scholarship and demonstrated financial need.

The Mary L. McKenzie Scholarship is awarded to a student in Health Information Administration (HIA). It is based on scholarship and demonstrated financial need.

The Elton T. Ridley Minority Scholarship is awarded to a student in HIA. It is based on scholarship and demonstrated financial need. The scholarship is awarded to a student who is a member of a classification of individuals who are traditionally underrepresented in the HIA program.

Awards

Based on superior performance and policies, the program faculty will recommend that qualified students be awarded degrees with distinction.