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The School of Informatics/New Media Program

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 throughout the foreseeable future. The School of Informatics prepares students to meet the increasing demand for information technology professionals. The curriculum combines knowledge of a specific subject area (or cognate area) with the concepts in informatics that will help students adapt to technological changes throughout their careers. The proverb says that if you give people fish, you’ve fed them for a day, but if you teach them how to fish, you’ve fed them for a lifetime. Like the proverb, informatics teaches students how to adapt to technological changes while preparing them for lifelong learning in their careers and in their lives.

The undergraduate curriculum looks at information technology from a liberal arts perspective. It goes well beyond a “technical school” approach to educate students in the underlying science of information and information technology and to explore their human implications. The School of Informatics educates students in the technical, psychological, and social aspects of information technology and, at the same time, educates them in the application of information technology to another discipline or “cognate area.”

The curriculum is designed in two axes. One axis is the technical dimension, running from the logical and mathematical foundations of information technology to the issues of distributed information and knowledge systems. The other axis represents the human dimension, from the individual working with a computer and the area of human computer interaction to groups interacting via computers with each other and the areas of social and organizational informatics. Where these two axes cross, we have the intersection of the human and the technical, of art and science. Also at that intersection we have “New Media”—the use of computers and the Internet as multimodal communication devices that allow the expression of the human spirit through the visual arts, music, voice, and text. Thus we have the five areas of the informatics curriculum: mathematical foundations, distributed information, human computer interaction, social/organizational informatics, and new media.

The curriculum gives students a solid foundation in the five areas while encouraging them to specialize their training through informatics electives and by applying their informatics skills in a cognate area.

Bridging the specialization and cognate areas is the idea that students learn how information technology relates to a traditional discipline in the liberal arts or the professions. Therefore, students take 15-18 credit hours in a cognate area that both grounds students in the discipline and emphasizes some combination of applications, implications, and foundations of information technology.

In addition to knowledge of core informatics and of informatics in the context of a traditional discipline, students also 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 degree, four specialized professional master's degrees, and a variety of undergraduate and graduate programs in new media. Degrees in informatics not only combine existing course offerings, but also create innovative courses and curricula in new and emerging aspects of information technology. Informatics research is conducted at the Informatics Research Institute, which provides expanded educational opportunities for both undergraduate and graduate students.

The Development of the School of Informatics

The School of Informatics has grown out of years of planning and discussion, both at IUB and IUPUI. In the fall of 1997, a Task Force on Informatics, chaired by Richard Shifrin (director of the Cognitive Science Program, IUB), was formed to study ways in which the university could capitalize on its strengths in information technology and to make a recommendation for further development. The membership of that task force came from both the IUB and IUPUI campuses and represented a wide range of disciplines involved in information technology. This task force report recommended that IUB establish the School of Informatics.

In the summer of 1998, President Myles Brand created an Informatics Planning Committee chaired by Dennis Gannon (chair of computer science, IUB). The committee was charged with developing a detailed implementation plan for this metaschool. The committee document outlined how an undergraduate degree in informatics could fruitfully require a substantial number of courses in an area outside of the core informatics courses. It also called for the creation of a research institute and for a small core faculty. The Informatics Planning Committee gave the following motivation for the new school:

The movement of society into the information age involves developments in science and technology, distributed information processing, computer and cognitive science, social aspects of dealing with distributed information, knowledge retrieval, distributed teaching and learning, information dissemination, and many related themes. All academic and research programs at IU are (or shortly will be) affected by these developments. This task force recommends that a new school, tentatively titled "School of Informatics," be formed to promote teaching, training, and research in these areas, and thereby play a catalyzing role in this ongoing evolutionary process.

On January 1, 1999, President Brand appointed an interim dean, J. Michael Dunn (computer science and philosophy, IUB) and an interim associate dean, Darrell Bailey (music and new media, IUPUI). With the guidance of a multidisciplinary faculty advisory committee of more than 50 members, the school began to take shape. The Indiana Commission for Higher Education formally approved the school in November, authorizing IU to admit its first informatics majors in the fall of 2000.

One School, Two Campuses

The School of Informatics spans the IU Bloomington (IUB) and Indiana University Purdue University Indianapolis (IUPUI) campuses. By combining the strengths of these two campuses, the School of Informatics is able to create a unique environment that enables students to earn degrees with strong information technology components in arts, humanities, science, and the professions. The expert faculty and excellent technological resources foster a synthesis of academic disciplines and cultures. Faculty from several departments share developments in the fast-moving information technology areas through the School of Informatics and its degree programs. The school is actively forging cooperative arrangements with employers in the state and region and creating internships, cooperative education programs, and opportunities for learning through service.

Informatics Research Institute

Research and theory in informatics move rapidly to application and development. The faculty teaching in the School of Informatics participates in research activities and new applications of technology. As a result, faculty can transmit state-of-the-art knowledge to students. Indiana University is capitalizing on this great research strength in informatics with the formation of an Informatics Research Institute (IRI). IRI will conduct research in areas of emphasis 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 in Informatics, a Bachelor of Science in Media Arts and Science, and an Associate of Science in Media Arts and Technology.

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 or newmedia.iupui.edu to confirm current program requirements.

Probationary Admission to New Media
Individuals who do not qualify for a direct admission or whose college grade point average is lower than 2.0 (C) may petition the New Media Program for probationary admission. Special consideration is given to adult learners and students returning after five or more years. Petitions are available from the New Media Program Office, SI 115, (317) 278-7666.

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

At the discretion of the associate dean, the New Media Program 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 scores of at least 650. Such students are counseled through the New Media Program 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 is usually the only acceptable excuse for absence from class. Other absences must be explained to the satisfaction of the instructor, who will decide whether missed 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, which is as follows:

\[ \begin{align*}
A+ &= 4.00 \\
A  &= 4.00 \\
A- &= 3.70 \\
B+ &= 3.30 \\
B  &= 3.00 \\
B- &= 2.70 \\
C+ &= 2.30 \\
C  &= 2.00 \\
C- &= 1.70 \\
D+ &= 1.30 \\
D  &= 1.00 \\
D- &= 0.70 \\
F  &= 0.00
\end{align*} \]

The following grades carry no grade points: I (Incomplete), NC (No Credit), NR (No Report Filed by Instructor), P (Passing), R (Deferred), S (Satisfactory), and W (Withdrawn).

Grade Point Average
The cumulative grade point average is computed by dividing the total number of grade points earned by the total number of credit hours completed in which grades of A through F are assigned. Credit earned at another institution may be applied toward degree requirements, but the grades earned at other institutions will not be calculated in the Indiana University cumulative grade point average.

Change of Grade
A student desiring a change of grade should discuss the situation with the instructor. A change of grade must be justified. If the instructor agrees, the faculty member will file a Grade Change Authorization Form. If the instructor and student do not agree on a changed grade or if the instructor cannot be located, the student should discuss the matter with the chairperson or director of the department offering the course. Appeals unresolved at this level may be referred to the academic deans. Appeals of grades or requests for other actions normally will not be considered after one calendar year from the end of the semester in which the course in question was taken.

Incomplete Courses
A temporary grade of Incomplete (I) on the transcript indicates that the course work is mostly completed, generally 75 to 80 percent, and of passing quality. It is the student's responsibility to contact the instructor to have a grade of Incomplete assigned. The instructor specifies the work to be done to remove the grade of Incomplete and the period of time allowed for completion. If the student fails to remove the Incomplete within one calendar year, the Office of the Registrar will change the grade to an F. The dean (or instructor) authorizes adjustments of this period in exceptional circumstances. A student who has received a grade of Incomplete should not register for the course a second time but should arrange with the instructor to have the I changed to a letter grade upon completion of requirements, provided that it is done within the year.

Pass/Fail Option
Students in the School of Informatics may elect to take a maximum of 12 credit hours (4 courses) total under the Pass/Fail option. The procedure for declaring this option may be found in the Schedule of Classes. Special regulations affecting the Pass/Fail option for School of Informatics students are as follows:

1. Only one course per semester or one course per summer session may be taken under the Pass/Fail option.
2. School of Informatics students may not take any informatics course Pass/Fail. In addition, the Pass/Fail option may not be used for any course that satisfies admission or general-education elective requirements or the student's cognate area. Only university elective courses may be taken on a Pass/Fail basis.
3. 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.
4. Pass/Fail forms are available in the School of Informatics Office and the New Media Program Office.

R Grade
The R grade (Deferred) on the final report indicates that the nature of the course is such that the work of the student can be evaluated only after two or more terms. Courses in which an R grade is assigned will be announced as deferred grade courses in the Schedule of Classes.

FX Option
FX denotes an undergraduate level course originally failed and subsequently retaken.

The School of Informatics will calculate FX grades as grades of F for internal purposes and degree requirements. This calculation will apply to all categories of academic standing: good standing, probation and dismissal, class rank, and all grade point average requirements in the degree, including cumulative, semester, and major concentrations.

A student may use the FX option for purposes of the university transcript. An undergraduate student who has repeated a course previously failed may request to have only the second grade in that course counted in the student's grade point average as entered on the student's transcript. A student may exercise this FX option for no more than three courses, totaling no more than 10 credit hours. A student may use the FX option on the transcript only once for a given course. Requests for approval of FX courses should be made in consultation with the student's advisor or the New Media Program recorder.

Withdrawals
A grade of W (Withdrawn) is given automatically to the student who withdraws from courses during the automatic withdraw period as specified in the Schedule of Classes. After the automatic withdrawal period a student may withdraw only with the
permission of the dean. This approval is given only for urgent reasons related to extended illness or equivalent distress. The desire to avoid a low grade is not an acceptable reason for withdrawal from a course.

A grade of W does not affect the overall grade point average. A grade of F will be recorded on the official transcript if a student stops attending but does not officially withdraw from class. Students who alter their schedules, whether at their own initiative or by departmental directive, must follow withdrawal procedures. Students who do not assume this responsibility are jeopardizing their records because they will incur a failing grade in a course not properly dropped and will not receive credit for work done in a course not properly added.

To withdraw from any or all courses, students must submit to the registrar's office a schedule adjustment form that has been signed by the advisor. If forms are turned in no later than the beginning of classes, the course will be deleted from student records, except for complete withdrawals, which result in the grade of W (Withdrawal) on student records. If withdrawals are turned in by the end of the first half of the semester or summer session, the grade of W is automatically given and recorded on the official transcript. Thereafter, but prior to the end of the third quarter of classes, both the advisor's and the instructor's signatures are required for withdrawal, and the instructor designates the grade of W or F.

Upon notification from the IUPUI registrar's office that a student has accumulated eight (8) or more W's, the School of Informatics will send a letter of concern to the student, requesting an explanation. This notification will likewise remind students that their record of withdrawals from courses may jeopardize financial aid. Students with 10 W's may be regarded as not making the "reasonable academic progress" required to maintain eligibility for financial aid. Students with 10 W's may be regarded as not making the "reasonable academic progress" required to maintain eligibility for financial aid, and lack of such progress constitutes grounds for denying further financial aid.

Academic Standing
A student is in good academic standing for an Indiana University bachelor's degree when his or her semester grade point average is a minimum of 2.0 (C) for the last semester's course work, and when his or her cumulative grade point average is at least 2.0 (C). Students must be in good academic standing to graduate.

Class Standing
Class standing is based on the number of credit hours completed:
- Freshman, fewer than 26 credits
- Sophomore, 26 to 55 credits
- Junior, 56 to 85 credits
- Senior, 86 or more credits

Semester Load
A typical full-time academic load is 12 to 17 credit hours per semester, with the average load being approximately 15 credit hours. Students who expect to carry more than 17 credit hours a semester should have a cumulative grade point average of at least 3.0 (B) and have the approval from an academic advisor or dean.

Academic Probation
Students will be placed on academic probation if their cumulative or semester grade point average (semester grade index) is below 2.0. After one semester on probation, students who fail to return to good academic standing will be placed on critical probation. At the discretion of the dean, these students can be dismissed. If a student is given the opportunity to enroll under critical probation, the School of Informatics will establish strict conditions that must be met before that student will be allowed to register for future classes.

Dismissal
Students can be dismissed if they fail to return to good academic standing after one semester on critical probation. Students may also be dismissed if, in the opinion of the dean, they are not making satisfactory progress toward their degree.

Readmission
Dismissed students must petition the dean of the School of Informatics for readmission. A Petition for Readmission form must be filed by July 15 for fall, November 15 for spring, and April 15 for summer readmission. A student who has been dismissed for the second time is eligible to return to school only after being out of school for one regular semester and having petitioned successfully. A third dismissal is final. Dismissed students whose petitions are denied will not be allowed to register.

Academic Misconduct
Cheating
Cheating is dishonesty of any kind with respect to course assignments, alteration of records, or examinations. It is the student's responsibility not only to abstain from cheating, but also to avoid the appearance of cheating and to guard against making it possible for others to cheat. Any student who helps another student cheat is as guilty of cheating as the student who cheated. The student also should do everything possible to induce respect for the examining process and for honesty in the performance of assigned tasks in or out of class.

Plagiarism
Plagiarism is assuming credit for someone else's work, words, or ideas—whether or not the ideas are expressed in the borrower's own words. Honesty requires that any ideas or materials taken from another source for either written or oral use must be fully acknowledged. Plagiarism includes language or ideas taken from isolated formulas, sentences, or paragraphs; entire articles copied from books, periodicals, speeches; the writings or created works of other students; and materials assembled or collected by others in projects or collections without acknowledgement.

A faculty member who has evidence that a student is guilty of cheating or plagiarism will initiate the process of determining the student's guilt or innocence. No penalty will be imposed until the student has been informed of the charge and of the evidence on which it is based and has been given an opportunity to present a defense. If the faculty member finds the student guilty, the faculty member assesses a penalty within the course and promptly reports the case in writing to the dean of the school or comparable head of the academic unit. The report should include the names of any other students who may be involved in the incident and recommendations for further action. The dean, in consultation with the faculty member if the latter so desires, will initiate any further disciplinary proceedings and inform the faculty member of any action taken. In every case, a record of the offense remains on file.

For further regulations, please refer to the IUPUI Code of Student Rights, Responsibilities, and Conduct.

Student Grievance Procedures
All academic personnel (faculty, part-time instructors, and advisors) are expected to conform to the Code of Academic Ethics published in the Indiana University Academic Handbook. Students who feel that a faculty member has treated them unfairly may lodge a complaint by following these steps: (1) Discuss the matter with the faculty member or instructor. (2) If step 1 fails to resolve the situation, discuss the matter with the chairperson of the department or the coordinator of the program in which the faculty member is employed. The departmental chairperson will discuss it with the faculty member and seek some resolution. (3) If step 2 fails, the student may discuss the matter or file a written, signed complaint with the dean. Anonymous complaints will not be entertained. A copy of any written complaint will be forwarded to the faculty member, who may respond in writing. (4) When warranted, the dean may refer a written complaint and the faculty member's response to the Faculty Affairs Committee for further investigation and review. (5) The Faculty Affairs Committee will evaluate the complaint on the basis of university policy and may recommend to the dean that the instructor be sanctioned. If the committee finds the complaint to be unfounded, a letter to that effect may be placed in the student's file.

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.
Bachelor of Science in Informatics

Degree 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 30 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–.
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 a cognate area may also meet the general education distribution requirements.
5. Cognate area courses cannot count as informatics core courses or informatics elective courses.
6. If cognate area courses are equivalent to informatics core courses, students should substitute additional informatics elective courses in place of informatics core courses to meet the 30 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 B.S. in Informatics consists of five parts:
- Informatics Core Courses
- Informatics Electives
- Cognate Area Courses
- General-Education Requirements
- General Electives

Informatics Core Courses (30 cr.)

INFO I101 Introduction to Informatics (3 cr.)
INFO I200 Information Representation (3 cr.)
INFO I201 Mathematical Foundations of Informatics (4 cr.)
INFO I202 Social Informatics (3 cr.)
INFO I210 Information Infrastructure I (4 cr.)
INFO I211 Information Infrastructure II (4 cr.)
INFO I303 Organizational Informatics (3 cr.)
Capstone Project (6 cr.) INFO I450/I451 Design and Development of an Information System (3-3 cr.) (senior standing), two semesters or INFO I460/I461 Thesis (3-3 cr.) (senior standing), two semesters.

With prior approval from the dean, a student may substitute INFO I450/I451 and INFO I460/I461 with an equivalent capstone experience in another department, or complete 6 credit hours of INFO I420, Internship in Informatics Professional Practice, to fulfill the capstone experience. Internships require students to be at a junior or senior standing. A project or report must be submitted after the internship is completed.

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.)

Informatics Electives (9 cr.)

Select 9 credit hours from the following courses:
BUS S302 Management Information Systems (3 cr.)
BUS S305 Business Telecommunications (3 cr.)
BUS S307 Data Management (3 cr.)
BUS S310 Systems Analysis and Design (3 cr.)
BUS S405 Alternative Development Methods and Systems (3 cr.)
BUS S410 Systems Implementation (3 cr.)
INFO I300 Human Computer Interaction (3 cr.)
INFO I310 Multimedia Arts and Technology (3 cr.)
INFO I320 Distributed Systems and Collaborative Computing (3 cr.)
INFO I400 Topics in Informatics (3 cr.)
JOUR J300 Journalism/Communications Law (3 cr.)
JOUR J414 Globalization of Information (also International Newsgathering Systems) (3 cr.)
SOC S519 Science, Technology, and Society (3 cr.)
TEL T321 Telecommunications Policy (3 cr.)
TEL T421 Economics of Telecommunications (3 cr.)
TEL T427 International Telecommunications (3 cr.)
INFO I400 Topics in Informatics (3 cr.)
JOUR J300 Journalism/Communications Law (3 cr.)
JOUR J414 Globalization of Information (also International Newsgathering Systems) (3 cr.)
SOC S519 Science, Technology, and Society (3 cr.)
TEL T321 Telecommunications Policy (3 cr.)
TEL T421 Economics of Telecommunications (3 cr.)
TEL T427 International Telecommunications (3 cr.)

Any course at the 300 level or above in computer technology, computer and information science, or new media may count as an elective.

Note: All of the above courses are subject to the successful completion of prerequisites or approval of the instructor. This list is expandable. Students should consult the School of Informatics office or refer to our Web site at informatics.iupui.edu for the most current list of informatics electives. Students also may count other courses with informatics content as informatics electives upon approval of the dean.

Cognate Area Courses (15-18 cr.)

Departments offering informatics cognate courses are listed in the appendix. Students should, in consultation with their academic advisors, choose cognate areas before their sophomore year. Students must contact the School of Informatics office or refer to our Web site at www.informatics.iupui.edu for the most current list of cognate areas.

General-Education Requirements (38-41 cr.)

English Composition (3 cr.)

This writing requirement may be fulfilled in any one of the following ways:
ENG W131 Elementary Composition I (3 cr.) with a grade of C (2.0) or better.

Writing (3 cr.)

ENG W231 Professional Writing Skills, an approved substitute (3 cr.), or completion of one intensive writing course at the 200 level or above after completing the English requirement.

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 (3 cr.)

Quantitative and Analytical Skills (6 cr.)

IUPUI:

1. Select one of the following: MATH M118 Finite Mathematics, M119 Brief Survey of Calculus I, M163 Integrated Calculus and Analytic Geometry I, or M164 Integrated Calculus.
2. Required: STAT 311 Introductory Probability (3 cr.) or MATH M568 Statistics for Informatics (3 cr.)

Natural Sciences (8 cr.)

Select a minimum of 8 credit hours from the courses listed below. At least one of the courses must be a laboratory course.

Anthropology ANTH A103 Human Origins and Prehistory (3 cr.)

Astronomy AST A100 The Solar System (3 cr.), A105 Stellar Astronomy (3 cr.)

Biology

BIOI K101 Concepts of Biology I-Plants (5 cr.), K103 Concepts of Biology II-animals (5 cr.), N100 Contemporary Biology (3 cr.), N107 Introduction to Zoology (4 cr.), N200 The Biology of Women (3 cr.), N212 Human Biology (2 cr.), N213 Human Biology Laboratory (1 cr.), N214 Human Biology (2 cr.), N215 Human Biology Laboratory (1 cr.), N217 Human Physiology (5 cr.), N251 Introduction to Microbiology (3 cr.), N322 Introduction Principles of Genetics (3 cr.)

Chemistry

CHEM C100 The World of Chemistry (3 cr.), C101 Elementary Chemistry I (5 cr.), C102 Elementary Chemistry II (5 cr.), C105 Principles of Chemistry I (5 cr.), C106 Principles of Chemistry I (5 cr.)

Geography

GEOG G107 Physical Systems of the Environment (3 cr.), G108 Physical Systems of the Environment: Laboratory (2 cr.), G185 Global Environmental Change (3 cr.), G303 Weather and Climate (3 cr.), G307 Biogeography: the Distribution of Life (3 cr.)

Geology

GEOG G107 Environmental Geology (3 cr.), G117 Environmental Geology Laboratory (1 cr.), G109 Fundamentals of Earth History (3 cr.), G119 Fundamentals of Earth History Laboratory (1 cr.), G110 Physical Geology (5 cr.), G120 Physical Geology Laboratory (1 cr.), G206 Advanced
Informatics students must have basic training in the arts, humanities, and social sciences, which will assist them in their lives and give them a broader perspective from which to approach the applications of information technology. The requirements for each campus are as follows:

Select one arts and humanities course (3 cr.) from the following:

- AFRO A150 Afro-American Studies (3 cr.)
- AMST A103 Topics in American Studies (3 cr.)
- CLAS C205 Classical Mythology (3 cr.)
- CMLT C190 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 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 R175 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 Women's Studies (3 cr.)

Select one social science course (3 cr.) from the following:

- AFRO A150 Afro-American Studies (3 cr.)
- AMST A103 Topics in American Studies (3 cr.)
- ANTH A104 Culture and Society (3 cr.)
- CMLT C190 Introduction to Film (3 cr.)
- COMM T130 Introduction to Theatre (3 cr.)
- ENG G104 Language Awareness (3 cr.)
- FOLK F101 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 Y103 Introduction to Political Science (3 cr.)
- POLS Y105 Introduction to American Politics (3 cr.)
- POLS Y215 Introduction to Public Policy (3 cr.)
- POLS Y217 Introduction to Public Affairs (3 cr.)
- POLS Y219 International Relations (3 cr.)
- PSY B104 Psychology (3 cr.)
- PSY B310 Life Span Development (3 cr.)
- SOC R100 Sociology (3 cr.)
- SOC R121 Social Problems (3 cr.)
- WOST W105 Introduction to Women's Studies (3 cr.)

Select one comparative world cultures course (3 cr.) from the following:

- 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 H110 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.)

Select one ethics course (3 cr.) from the following:

- REL R283 Religion, Ethics and Values (3 cr.)
- REL R293 Ethics and World Religions (3 cr.)
- REL R393 Comparative Religious Ethics (3 cr.)
- PHIL P120 Ethics (3 cr.)
- PHIL P325 Social Philosophy (3 cr.)
- PHIL P336 Ethical Theory (3 cr.)
- PHIL P393 Biomedical Ethics (3 cr.)
- PHIL P494 Topics in Biomedical Ethics (3 cr.)

In addition, students must take a junior/senior integrator course (3 cr.). (See academic advisor.)

- HIST H114 History of Western Civilization II (3 cr.)

**Dual Baccalaureate Degrees**

In certain circumstances students may be permitted to pursue a B.S. in Informatics and complete an undergraduate degree in another degree-granting school of the university. Check with your 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.

**Certificate and Minor 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 26 credit hours from the following list:
   - INFO H101 Introduction to Informatics (3 cr.)
   - INFO H200 Information Representation (3 cr.)
   - INFO H202 Social Informatics (3 cr.)
   - INFO H210 Information Infrastructure I (4 cr.), cross-listed with CSCI A201 Introduction to Programming I (IUB), and CSCI N331 Visual Basic Programming (IUPUI)
   - INFO H211 Information Infrastructure II (4 cr.), cross-listed with CSCI A202 Introduction to Programming II (IUB), and CSCI N345 Advanced Programming, Java (IUPUI)
   - INFO H300 Human Computer Interaction (3 cr.)
   - INFO H303 Organizational Informatics (3 cr.)
3. In addition students must take an additional course (3 cr.) from the informatics curriculum. These additional courses can be chosen from the listed electives for informatics and can therefore be taken in another department.

**Minor in Informatics**

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 H101 Introduction to Informatics (3 cr.)
   - INFO H200 Information Representation (3 cr.)
   - INFO H202 Social Informatics (3 cr.)
   - INFO H210 Information Infrastructure I (4 cr.), cross-listed with CSCI A201 Introduction to Programming I (IUB) and CSCI N331 Visual Basic Programming (IUPUI)
   - INFO H211 Information Infrastructure II (4 cr.), cross-listed with CSCI A202 Introduction to Programming II (IUB) and CSCI N345 Advanced Programming, Java (IUPUI)
   - INFO H300 Human Computer Interaction (3 cr.)
   - INFO H303 Organizational Informatics (3 cr.)
3. Students are required to take two courses from the following list of upper-level courses:
   - INFO H300 Human Computer Interaction (3 cr.)
   - INFO H303 Organizational Informatics (3 cr.)
4. Students must select one course from the list of approved informatics elective courses.

**Minor in Business**

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

- BUS A100 Basic Accounting Skills (1 cr.)
- BUS A201 Introduction to Financial Accounting (3 cr.)
- BUS A202 Introduction to Managerial Accounting (3 cr.)
- ECON E201 Introduction to Microeconomics (3 cr.)
- ECON E202 Introduction to Macroeconomics (3 cr.)
- ECON E270 Introduction to Statistical Theory in Economics (3 cr.)
- MATH M118 Finite Mathematics (3 cr.)
- MATH M119 Brief Survey of Calculus I (3 cr.)

In addition, BUS R201 The Computer in Business, or its equivalent, must be completed with a minimum
The New Media Program at IUPUI offers an Associate of Science in Media Arts and Technology, a Bachelor of Science in Media Arts and Science, and a Certificate in Internet Application Development; all provide an integrated approach to the study of new media. Focused on applied research and application, these degrees are oriented toward professional practice. Together, they encompass the design, development, management, integration, application, assessment, and deployment of new and digital media to communication.

The programs and requirements described apply in the New Media Program at IUPUI.

New Media Degree Programs, IUPUI

The New Media Program at IUPUI offers an Associate of Science in Media Arts and Technology, a Bachelor of Science in Media Arts and Science, and a Certificate in Internet Application Development; all provide an integrated approach to the study of new media. Focused on applied research and application, these degrees are oriented toward professional practice. Together, they encompass the design, development, management, integration, application, assessment, and deployment of new and digital media to communication.

The programs and requirements described apply in the New Media Program at IUPUI.

Associate of Science in Media Arts and Technology

Course Requirements

The course work required for the A.S. in Media Arts and Technology consists of three parts:

New Media Core Courses
General-Education Requirements
General Electives

Required New Media Core Courses (18 cr.)

CPT 115 Computer Information Systems
CPT 140 Programming Constructs Lab (3 cr.)
CSCI N241 Introduction to Web Design (3 cr.)
ENG W131 English Composition I (3 cr.)
NEWM N100 Introduction to Digital Media Principles (3 cr.)
NEWM N101 Topics in Interactive Multimedia (3 cr.)

General-Education Requirements (6 cr.)

Communication Skills

COMM R110 Fundamentals of Speech (3 cr.)
ENG W132 English Composition II (3 cr.) or JOUR J200 Reporting, Writing, and Editing (3 cr.)

Foreign Language (6 cr.)

Students must complete 6 credit hours in a foreign language. Chinese or Japanese is recommended.

Quantitative and Analytical Skills (6 cr.)

Select from the following:

MATH M111 Algebra (4 cr.) or higher-level course (excluding MATH 130, MATH 131, MATH 132)
MATH M153 Algebra and Trigonometry I (3 cr.)
PHIL P162 Practical Logic (3 cr.)
PHIL P265 Elementary Symbolic Logic (3 cr.)

Arts and Humanities (6 cr.)

Select from the following:

CMLT C100 Introduction to Film (3 cr.)
COMM T130 Theatre Appreciation (3 cr.)
HER H100 Art Appreciation (3 cr.)
MUS M174 Music for the Listener (3 cr.)
PHIL P120 Personal and Social Ethics (3 cr.)

Sciences (6 cr.)

Choose 6 credit hours from the courses offered in the following departments: astronomy, biology, chemistry, computer science, geography, physics, and/or psychology (PSY B105 Psychology only).

General Electives (12 cr.)

Select courses from the following schools or departments: art, computer science, computer technology, journalism, library and information science, music, and/or new media.

Bachelor of Science in Media Arts and Science

All students must meet the requirements as established by the faculty of the New Media Program and applied to all IUPUI New Media students. The New Media Program, Office of Student Affairs, Mary Cable Building 117, can answer questions about general-education courses and distribution requirements.

Degree Requirements

1. All IUPUI students must fulfill the following undergraduate requirements:
   6 credit hours of Communication Skills (written and oral)
   10 credit hours of Foreign Language
   6 credit hours of Quantitative and Analytical Skills
   6 credit hours of Arts and Humanities
   6 credit hours of Social Sciences

2. A minimum of 122 credit hours is required for a New Media degree.

3. A minimum cumulative grade point average of 2.0 (C) is required for graduation.

4. A minimum of 36 credit hours must be at the 300-400 level. Courses taken at other institutions at the freshman and sophomore levels, regardless of title or description, will not be accepted in satisfaction of this requirement.

5. At least 12 credit hours of 300-400 level courses must be taken outside the major program as electives.

6. A maximum of 12 credit hours may be taken using the Pass/Fail option and applied to university electives only.

7. A minimum of 24 credit hours must be taken in the concentration/specialization area. For requirements in the concentration/specialization area, refer to the plan of study, available from your advisor.

8. Any course in which a student receives a grade below C (2.0) may not be used to fulfill any requirement (a C- will not count).

9. A minimum of 26 credit hours of the work of the senior year must be completed at IUPUI except in the case of students transferring within the campuses of Indiana University. (See academic advisor for specific residency requirements.)

10. Credit to the degree will not be accepted for remedial courses.

11. 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 variable titled courses, seminars, independent study, internships, and other special courses.

Course Requirements

The course work required for the B.S. in Media Arts and Science consists of six parts:

Required New Media Core Courses
Web-Based Computer Programming
Concentration/Specialization Courses
New Media Electives
General-Education Requirements
University Electives

The New Media Program recommends that students complete English W131 or Honors W140 during the first semester or as soon afterward as placement test scores and course availability allow. Students whose placement test scores indicate a need to take English W001 should enroll in that course their first semester. Students must earn a minimum grade of C in English W001 to advance to English W131. It is also recommended that English W132, W150, or JOUR J200 be taken the semester following successful completion of English W131.

Speech Communication R110 (3 cr.)

Students with previously acquired competency in public speaking may be eligible for special credit and exemption from the requirement; contact the chairperson of the Department of Communication Studies, Cavanaugh Hall 309, or call (317) 274-0566.

Foreign Language Requirement Placement Test

Students with previous experience in a foreign language should take the Foreign Language Placement Test at the Testing Center to assess their level of language preparation. Students who complete the required course into which they were placed with a minimum grade of C are eligible for special credit at a reduced fee for the appropriate lower-division course(s) that precede the course taken. Foreign language special credit counts toward graduation and toward the foreign language requirement.

Courses numbered 117 are reserved for students who have never studied the language before. Students who have had two or more years of formal study in a language may take a 117-level course in that language as a refresher course before enrolling in a more advanced course. Their work will be graded on a Satisfactory/Fail (S/F) basis. A grade of S is equivalent to a minimum grade of C.
Nonnative Speakers  Students for whom English is not a first language may be exempted from the foreign language requirement, without credit, by completion of English W131 and W132 with a minimum grade of C or better.

Native speakers of English who have achieved elementary or intermediate proficiency in a foreign language by studying or living in a country where the language is spoken should confer with the foreign languages and cultures department for placement in the correct level of that foreign language.

Advanced Courses  In addition to advanced courses in one's major, the new media student should conduct in-depth study in other areas. Courses at the 300 level or above must be completed in five areas:

Required Core (6 cr.), Web-Based Programming (9 cr.), Concentration or Specialization (12 cr.), New Media Electives (12 cr.), and University Electives (12 cr.).

Required New Media Core Courses (18 cr.)
- CSCI N241 Introduction to Web Design (3 cr.)
- CSCI N301 Fundamental Computer Science Concepts (3 cr.)
- ENG W131 English Composition I (3 cr.)
- NEWM N100 Introduction to Digital Media Principles (3 cr.)
- NEWM N101 Topics in Interactive Multimedia (3 cr.)
- NEWM N499 Capstone: Portfolio or Project (3 cr.)

Web-Based Computer Programming (9 cr.)
Select from the following:
- CSCI N305 C Language Programming (3 cr.)
- CSCI N331 Visual Basic Programming (3 cr.)
- CSCI N341 Web Programming (3 cr.)
- CSCI N345 Advanced Programming, Java (3 cr.)
- CSCI N351 Introduction to Multimedia Programming (3 cr.)
- CSCI N355 VRML (3 cr.)

Concentration/Specialization Courses (24 cr.)
Select from one of the following areas (of which 12 credits must be at the 300 level or above):

Area 1  Computer science, computer technology, library information and science, and/or new media

Area 2  Art, journalism, music, and/or new media

New Media Electives (12 cr.)
Students must complete 12 credit hours of media arts and science electives at the 300 level or above.

General-Education Requirements

Communication Skills
- COMM R110 Fundamentals of Speech Communication (3 cr.)
- ENG W132 English Composition II (3 cr.) or JOUR J200 Reporting, Writing, and Editing I (3 cr.)

Foreign Language (10 cr.)
Students must complete 10 credit hours in a foreign language. Asian languages are recommended.

Quantitative and Analytical Skills (6 cr.)
Select from the following:
- MATH M111 Algebra (4 cr.) or higher level course (excluding MATH 130, MATH 131, MATH 132)
- MATH M153 Algebra and Trigonometry I (3 cr.)
- PHIL P162 Logic (3 cr.)
- PHIL P265 Introduction to Symbolic Logic (3 cr.)

Arts and Humanities (6 cr.)
Select from the following:
- CMT C190 Introduction to Film (3 cr.)
- COMM T130 Introduction to Theatre (3 cr.)
- FOLK F101 Introduction to Folklore (3 cr.)
- HER H100 Art Appreciation (3 cr.)
- MUS M174 Music for the Listener (3 cr.)
- REL R153 Introduction to Religion (3 cr.)
- WOST W105 Introduction to Women’s Studies (3 cr.)

Social Sciences (6 cr.)
Select from the following:
- AFRO A150 Afro-American Studies (3 cr.)
- AMST A103 American Studies (3 cr.)
- ANTH A104 Anthropology (3 cr.)
- ECON E101 Economics (3 cr.), E201 Introduction to Microeconomics (3 cr.), or E202 Introduction to Macroeconomics (3 cr.)
- GEOG G110 Geography (3 cr.)
- LING G104 Linguistics (3 cr.)
- POLS Y101 Principles of Political Science (3 cr.) or POLS Y103 Introduction to American Politics (3 cr.)
- PSY B104 Psychology (3 cr.)
- SOC R100 Sociology (3 cr.)

University Electives (25 cr.) of which 12 hours must be completed at the 300 level or above:
Suggested electives:
- COMM G228 Discussion and Group Methods (3 cr.)
- COMM M373 Film and Video Documentary (3 cr.)
- COMM C380 Organizational Communication (3 cr.)
- HER E101 Beginning Drawing (3 cr.)
- HER E105 Beginning Painting (3 cr.)
- HER E201 Basic Photography (3 cr.)
- JOUR J210 Visual Communication (3 cr.)
- JOUR J300 Communication Law (3 cr.)
- PSY B366 Concepts and Applications in Organizational Psychology (3 cr.)
- STAT B305 Statistics (3 cr.)

or Any course from the following schools or departments: art, computer science, computer technology, journalism, library and information science, music, and/or new media.

Certificate in Internet Application Development

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:

Design Courses
- HER A371 Introduction to Interactive Design (3 cr.)
- HER B201 Visual Research Web Basics (3 cr.)

Writing Courses
- JOUR J100 Computer Methods for Journalists (3 cr.)
- JOUR J200 Reporting, Writing, and Editing I (P: ENG W131) (3 cr.)

Audio Courses
- MUS Z320 Foundations of Music Production (3 cr.)
- MUS Z320 Multimedia Design Applications (3 cr.)

Programming Course
- CSCI 241 Introduction to Web Design (3 cr.)

Application Development Courses
- CPT 323 Multimedia Systems (3 cr.) or CPT 423 Electronic Commerce (3 cr.)

Elective (3 cr.)
Students complete 3 credit hours in an internship, independent guided study application project, or an approved elective course from one of the following academic departments or schools: art, computer science, computer technology, journalism, library and information science, music, and/or new media.

Graduate Program

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

The School of Informatics offers five master's degrees:
- Master of Science in Bioinformatics
- Master of Science in Chemical Informatics
- 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).

Bioinformatics, Chemical Informatics, Health Informatics, and Human Computer Interaction require 36 credits, including the completion of two common graduate core courses. Media Arts and Science requires 30 credits, including the completion of 18 credit hours of 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, Mary Cable Building, Room 115, 525 N. Blackford Street, Indianapolis, IN 46202-3120. E-mail: info@informatics.iupui.edu

**Application Procedures for International Students**

Requests for information and completed applications should be sent to Office of International Affairs, IUPUI, Union Building, Room 207, 620 Union Drive, Indianapolis, IN 46202-5167.

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. Admission to the School of Informatics, excluding the New Media Program is decided on a rolling basis. In order to allow time for processing and making financial aid decisions, applicants must meet the following deadlines for matriculation in fall:

<table>
<thead>
<tr>
<th>Program</th>
<th>Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Informatics</td>
<td>January 15</td>
</tr>
<tr>
<td>New Media</td>
<td>March 15</td>
</tr>
<tr>
<td>Fall</td>
<td>November 15</td>
</tr>
</tbody>
</table>

Financial aid decisions will be made at the same time that admission decisions are made. Students must submit all application materials by the deadline to be considered for financial support.

**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 admission 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 GPA 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 applications 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. These forms are included in the application packet.
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 to a registrar, or given to the applicant by the registrar in a sealed and signed envelope.

**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.

**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. 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. The School is developing new sources of funding, and students are encouraged to review the Informatics Web site for up-to-date information or call the School of Informatics.

**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 Indianapolis campus has a center to provide these services for IUPUI graduate students located in the Union Building, Room 518; (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 Aid, IUPUI, Cavanaugh Hall 103, 425 University Blvd., Indianapolis, IN 46202; (317) 274-4162.
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.

Transfer of Credit

A maximum of 8 credit hours of graduate course work with grades of B (3.0) or better 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. (See “Revalidation” section below).

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:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4.0</td>
</tr>
<tr>
<td>A–</td>
<td>3.7</td>
</tr>
<tr>
<td>B+</td>
<td>3.3</td>
</tr>
<tr>
<td>B</td>
<td>3.0</td>
</tr>
<tr>
<td>B–</td>
<td>2.7</td>
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<tr>
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<tr>
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<tr>
<td>C–</td>
<td>1.7</td>
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<tr>
<td>D+</td>
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<tr>
<td>D</td>
<td>1.0</td>
</tr>
<tr>
<td>D–</td>
<td>0.7</td>
</tr>
<tr>
<td>F</td>
<td>Failed</td>
</tr>
<tr>
<td>NR</td>
<td>No grade reported</td>
</tr>
</tbody>
</table>

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

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 waiver 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, are prohibited because they undermine 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 either complete a capstone project or a research-based 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 the M.S. degrees must be met within five consecutive calendar years from the date of completion of the first credited (i.e., nondeficiency) course.

Master of Science Degrees

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 of bioinformatics. This is an interdisciplinary program at the Bloomington and Indianapolis campuses, involving faculty from the Departments of Biology, Chemistry, Computer Science, Library and Information Science, and others.

The end of the twentieth century saw an explosion of data discovered from living organisms, especially in areas of molecular biology and genetics. 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. In the mid-1990s, bioscience industries discovered the importance of bioinformatics to their goals and quickly stripped academic centers of many experts who would normally serve to educate a new generation of students. 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 Department of Computer and Information Science and the Department of Biology in the School of Science collaborate closely with the Department of Biochemistry and Molecular Biology and other departments in the School of Medicine. Many ongoing projects funded by federal agencies need the knowledge and technology of bioinformatics. The Department of Computer and Information Science has obtained funds from the Research Laboratories at Eli Lilly and Company for research in bioinformatics. Individual faculty members in the Department of Computer and Information Science and the Department of Biochemistry and Molecular Biology are also engaged in a research initiative in bioinformatics.

**Degree Requirements**

This curriculum includes a set of core and elective courses covering concepts and training in bioinformatics, biosciences and informatics, 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 non-classroom original research projects. Informatics and biosciences faculty will supervise these projects jointly.

**Prerequisites** Prospective students for graduate study in bioinformatics will be expected to have introductory background in both informatics and biology. Students need approximately 6 undergraduate credit hours of course work in biology, covering areas of molecular biology, genetics, and evolution. Students need approximately 6 undergraduate credit hours of computer science or informatics course work, covering areas of programming, discrete structures, and data structures. Students not having completed these prerequisites may need to take appropriate undergraduate courses to ensure regular progress through the program.

To receive the master's degree, the applicant must complete 36 credits in bioinformatics-related courses accepted for graduate credit, including 9 credit hours of core courses, 21 credit hours of electives, and 6 credit hours of project or thesis credit.

**Core Courses (9 cr.)**
- CSCI 548 Topics: Introduction to Bioinformatics (3 cr.)
- INFO I501 Introduction to Informatics (3 cr.)
- INFO I502 Information Management (3 cr.)

**Electives (21 cr.)**

Select from the following:
- BIOL 484 Cellular Biochemistry (3 cr.)
- BIOL 507 Molecular Biology (3 cr.)
- BIOL 540 Topics in Biotechnology (3 cr.)
- BIOL 545 Techniques in Biotechnology (3 cr.)
- BIOL 641 Microbial Genetics (2 cr.)
- CSCI 503 Operating Systems (3 cr.)
- CSCI 504 Concepts in Computer Organization (3 cr.)
- CSCI 506 Management of the Software Development Process (3 cr.)
- CSCI 507 Object-Oriented Design and Programming (3 cr.)
- CSCI 520 Computational Methods in Analysis (3 cr.)
- CSCI 536 Computer Networks (3 cr.)
- CSCI 541 Database Systems (3 cr.)
- CSCI 542 Distributed Database Systems (3 cr.)
- CSCI 565 Programming Languages (3 cr.)
- CSCI 580 Analysis of Algorithms (3 cr.)
- CSCI 590 Artificial Intelligence (3 cr.)
- CSCI 590 Database Mining (3 cr.)
- GRAD G685 Fundamental Molecular Biology (2-5 cr.)
- MGEN Q580 Basic Human Genetics (3 cr.)
- MGEN Q630 Genetics of Populations (3 cr.)
- STAT 511 Statistical Methods I (3 cr.)
- STAT 514 Designs of Experiments (3 cr.)

**Project/Thesis (6 cr.)**

Students must 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.

INFO I692 Thesis/Project in Bioinformatics (1-6 cr.)

**Master of Science in Chemical Informatics (36 cr.)**

The size of the information problem in chemistry is staggering. It can be judged from the fact that Chemical Abstracts Service adds over 700,000 new compounds to its database annually. Massive amounts of physical and chemical property data are generated each year for new and existing chemical substances. The avalanche of data can bury a chemical research project unless chemists find ways to cope with it. Fortunately, those trained in chemical informatics provide the tools to acquire, organize, and evaluate data, yielding new insights for further chemical research. Chemical informatics companies combine molecular simulation and data analysis techniques with high-quality graphical visualization to obtain stunning results. Chemical informatics thus helps chemists investigate new problems and organize and analyze scientific data to develop novel compounds, materials, and processes through the application of information technology.

The curriculum for a Master of Science in Chemical Informatics in the School of Informatics educates students in the following major aspects of chemical informatics:

- **Information Acquisition:** Methods used for generating and collecting data empirically (experimentation) or from theory (molecular simulation)
- **Information Management:** Storage and retrieval of information
- **Information Use:** Data analysis, correlation, and application to problems in the chemical and biochemical sciences

**Degree Requirements**

**Prerequisites** Prospective students for graduate study in chemical informatics will be expected to have training in both informatics and chemistry. If academic background is insufficient, some additional course work may be necessary to ensure progress through the program.

**Students with a Bachelor's Degree in Computer Science, Informatics, or Other Information Fields** Students with a B.A. in any information-based field will need approximately 22 undergraduate credit hours of course work in chemistry to provide sufficient background for course work required to study for the M.S. in Chemical Informatics. This includes:
- General Chemistry with laboratory (two semesters)
- Organic Chemistry (two semesters)
- Biological Chemistry or Biochemistry (one semester)
- Physical Chemistry (one semester)

**Students with a Bachelor's Degree in Chemistry (B.A. or B.S.)** Students with undergraduate degrees in chemistry (typically 25 or more credits in chemistry or biochemistry courses) will need some preparative work in informatics. Four or more credits in formal informatics course work, computer science courses relevant to informatics, or bioinformatics or chemical informatics course work will provide the necessary background for graduate study. Students not having completed this study may need to take appropriate undergraduate courses to ensure regular progress through the program.

**Core Courses (12 cr.)**
- CHEM 696 Special Topics in Chemistry (3-3 cr.), course content changes each semester. Students register for 3 credit hours for two semesters.
- INFO I501 Introduction to Informatics (3 cr.)
- INFO I502 Information Management (3 cr.)
- P: INFO I501

**Electives (18 cr., at least 6 of which must be in chemistry or biochemistry)**

**Biochemistry**
- BIOL B807 Enzyme Chemistry (3 cr.)
- BIOL G865 Fundamentals of Molecular Biology (3 cr.)

**Computer Science or Bioinformatics**
- BIOL K484 Cellular Biochemistry (3 cr.)
- BIOL K507 Molecular Biology (3 cr.)
- CHEM 533 Introduction to Biochemistry (3 cr.)
- CHEM 636 Biochemistry (3 cr.)
- CSCI 548 Introduction to Bioinformatics (3 cr.)

**Analytical Chemistry**
- CHEM 621 Advanced Analytical Chemistry (3 cr.)
- CHEM 629 Chromatography (3 cr.)
- CHEM 696 Chemometrics (3 cr.)

**Organic Chemistry**
- CHEM 651 Advanced Organic Chemistry (3 cr.)
- CHEM 652 Synthetic Organic Chemistry (3 cr.)
The School of Library and Information Science offers particular emphasis on consumer health informatics. The development of nursing informatics, with which is the largest in the country, is in the forefront of organizational management. The School of Nursing, offers an undergraduate degree in health information administration. This baccalaureate program prepares users of health informatics include medical information to establish best clinical practice reimbursement, which has created a need for improved classification, storage, and analysis of medical information to establish 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, behavioral health organizations, insurance companies, state and federal health care agencies, and health computing industries.

The IUPUI campus 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 Allied Health Sciences offers an undergraduate degree in health information administration. This baccalaureate program prepares professionals to plan and manage health information systems. The curriculum is grounded in computer systems, health law, medical documentation, and organizational management. The School of Nursing, which is the largest in the country, is in the forefront of 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. The Department of Computer and Information Science offers a master’s degree in computer science with a specialization in databases and data mining. The department supports the computer science requirements of the M.S. in Health Informatics. Faculty in the department are externally funded to conduct research in medical informatics and bioinformatics. Other academic programs at Indianapolis and Bloomington in public health, applied health sciences, and hospital administration offer important supporting course work.

The School of Informatics offers a Master of Science in Health Informatics (36 cr.). The School of Informatics offers a Master of Science in Health Informatics to address needs emanating from the 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 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, behavioral health organizations, insurance companies, state and federal health care agencies, and health computing industries.

The IUPUI campus 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 Allied Health Sciences offers an undergraduate degree in health information administration. This baccalaureate program prepares professionals to plan and manage health information systems. The curriculum is grounded in computer systems, health law, medical documentation, and organizational management. The School of Nursing, which is the largest in the country, is in the forefront of 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. The Department of Computer and Information Science offers a master’s degree in computer science with a specialization in databases and data mining. The department supports the computer science requirements of the M.S. in Health Informatics. Faculty in the department are externally funded to conduct research in medical informatics and bioinformatics. Other academic programs at Indianapolis and Bloomington in public health, applied health sciences, and hospital administration offer important supporting course work.

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.

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

All students applying for the M.S. in Health Informatics should have prerequisite courses or equivalencies in the following areas: Anatomy, biology, or physiology at the 200-level or higher (3 cr.)

Computer Science CSCI 5301 (3 cr.) or equivalent Medical Terminology (3 cr.)

To receive a master’s degree, the applicant must be admitted as a graduate student and complete 36 credits in health informatics-related courses numbered 500 or above as listed below. The following courses are offered at IUPUI; courses may also be taken at IUB with approval of the advisor.

Core Courses (15 cr.)

All of the following are required:
INFO 1901 Introduction to Informatics (3 cr.)
INFO 1902 Information Management (3 cr.), P: INFO 1901
INFO 1903 Social Impact of Information Technologies (3 cr.)
INFO 1930 Seminar in Health Informatics Applications (3 cr.)

Choose one of the following:
PBBL 6651 Biostatistics for Public Health (3 cr.)
NURS 6505 Measurement and Data Analysis (3 cr.)
SPEA 5158 Public Health Statistics (3 cr.)

Electives (15 cr.)
Elections may be selected from existing graduate courses in numerous schools and other academic units, depending on student need. Of these 15 credit hours, 9 credit hours must be selected from the list of informatics and computer science courses. (This list is neither exhaustive nor exclusive.) In consultation with their advisors, students will have wide latitude in choosing appropriate courses.

Informatics and Computer Science

CSCI 503 Operating Systems (3 cr.)
CSCI 504 Concepts in Computer Organization (3 cr.)
CSCI 536 Computer Networks (3 cr.)
CSCI 541 Database Systems (3 cr.)
CSCI 542 Distributed Database Systems (3 cr.)
CSCI 565 Programming Languages (3 cr.)
CSCI 590 Artificial Intelligence (3 cr.)
NURS 6190 Computer Technologies (3 cr.)
SLIS L542 Introduction to Human Computer Interaction (3 cr.)
SLIS L570 Online Information Retrieval (3 cr.)
SLIS L571 Information Networking (3 cr.)
SLIS L574 Communication in Electronic Environments (3 cr.)
SPEA H628 Health Care Information Systems (3 cr.)
SPEA V516 Public Management Information Systems (3 cr.)
SPEA V519 Database Management Systems (3 cr.)
SPEA V613 Implementation of Information Systems (3 cr.)

Design, Measurement, and Evaluation

AHET W520 Research Methodology for Allied Health (3 cr.)
AHET W570 Research Communication in Allied Health (3 cr.)
ECON E528 Economic Analysis of Health Care (3 cr.)
NURS 6505 Data Analysis for Clinical and Administrative Decision Making (3 cr.)
NURS R500 Nursing Research Methods I (3 cr.)
NURS R600 Nursing Research Methods II (3 cr.)
NURS R601 Instrument Development for Health Behavior I (2 cr.)
NURS R602 Instrument Development for Health Behavior II (2 cr.)
NURS R720 Metanalysis of Health/Illness or Disease/Illness (3 cr.)
NURS T617 Evaluation in Nursing (3 cr.)
PBBL 6652 Biostatistics II (3 cr.)
SPEA H517 Managerial Epidemiology (3 cr.)
Degree Requirements
To receive the master's degree, the applicant must be admitted as a graduate student and complete 36 credits of graduate study in HCI.

Core Courses (12 cr.)
- INFO I501 Introduction to Informatics (3 cr.)
- INFO I502 Information Management (3 cr.)
- SLIS L542 Introduction to HCI (3 cr.)
- EDUC Y502 Intermediate Statistics (or equivalent) (3 cr.)

Electives (18 cr.)
Students may choose from among the following and must take courses from at least two departments.
- BUS S601 MIS Research Topics in Applications Systems Design (3 cr.)
- BUS S602 MIS Research Topics in Administration and Technology (3 cr.)
- CSCI A546 User Interface Programming (3 cr.)
- CSCI B581 Advanced Computer Graphics (3 cr.)
- CSCI B582 Image Synthesis (3 cr.)
- CSCI B665 Software Engineering Management (3 cr.)
- CSCI B666 Software Management Implementation (1-3 cr.)
- CSCI B669 Topics in Database and Information Systems (1-6 cr.)
- CSCI B689 Topics in Graphics and Human-Computer Interaction (1-6 cr.)
- CSCI P565-P566 Software Engineering I-II (6 cr.)
- EDUC P544 Applied Cognition and Learning Strategies (3 cr.)
- EDUC P600 Topical Seminar in Learning Cognition and Instruction (3 cr.)
- EDUC R685 Human Computer Interface Design (1-3 cr.)
- JOUR J530 Issues in New Communication and Instruction (3 cr.)
- JOUR J530 Issues in New Communication Technologies (3 cr.)
- SLIS L576 Digital Libraries (3 cr.)
- SLIS L578 User Interface Design for Information Systems (3 cr.)
- SLIS L642 Information Usage and the Cognitive Artifact (HCI II) (3 cr.)
- SLIS L697 Advanced Topics in Information Systems (1-4 cr.)
- TEL T541 Processes and Effects: Individual Level Theory and Research (3 cr.)
- TEL T571 Applied Emotional and Cognitive Psychology Theory (3 cr.)

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.
- INFO I694 Thesis/Project in Human-Computer Interaction (1-6 cr.)

Master of Science in Media Arts and Science
This master's degree develops specialized skills and knowledge in new media with the purpose of preparing students to manage and conduct research on Internet and Web environments and multimedia production techniques. Like all new media programs, the master's degree is focused on applied research and application. The course of study is oriented toward professional practice and relies on a theory base drawn from fundamental disciplines that study communication as sight, sound, and motion.

Skills and knowledge embedded in this degree program include: Web site and multimedia research design, computer programming and database programming, multimedia authoring language skills and data collection, software, multimedia development of audio and video impact on users, digital graphics assessment techniques, and writing and editing of materials for multimedia evaluation and assessment.

The Master of Science in Media Arts and Science includes required courses in new media with specific emphasis on the philosophy and principles of the field as well as techniques using technology in communication and cybernetic/human interaction theory. Graduates will be prepared to conduct research in the development and effects of using communication technology in academic, social, and vocational settings. Opportunity will exist within the field for students to conduct applied research in media-related disciplines. Career options include 2D/3D artist, animator, creative technologist, multimedia producer, director of software development, electronic publisher, hypermedia specialist, Internet developer, graphic artist, interactive trainer, music producer, multimedia developer, composer, techno-artist, video/audio editor, webmaster, and Web site designer.

Admissions Requirements
In addition to those requirements outlined above (see “Admission to Master’s Programs”), students who apply for the Master of Science in Media Arts and Science must attend an interview to demonstrate their computer literacy, personal skills, and professional experience; and present a portfolio. The portfolio can include a multimedia application and/or an original computer software program.

Degree Requirements
The Master of Science in Media Arts and Science is a 30 credit hour program that includes a core of 18 hours and a specialization area of 12 hours. Electives will be available which allow students to specialize in “major field” areas within the new media graduate curriculum.

Core Courses (18 cr.)
- N500 Foundations of Media Arts Production (3 cr.)
- N501 TPCS: Principles of Multimedia Technology (3 cr.)
- N502 Digital Media Motion and Simulation Methods (3 cr.)
- N503 Multimedia Design Applications (3 cr.)
- N504 Advanced Interactive Design Applications (3 cr.)
- N505 Internship in Media Arts and Technology (3 cr.)
- N506 Media Arts and Technology Major Project (3 cr.)
- N510 Web Database Concepts (3 cr.)

Specialization Core Courses (12 cr.)
Specialization courses must be selected from the 400- and 500-level courses offered in the Schools of Informatics, Art, Journalism, Music, Library and Information Science, or the Departments of Computer Science and Computer Technology.

Area I: Computer science, computer technology, library information and science, and new media
Area 2: Art, journalism, music, and new media

Prior to enrollment in the courses, the School of New Media academic advisor and the head of graduate studies must approve the specialization core.

A minimum of B+ in each course of the new media graduate core is required for continuance in graduate study. Courses in the specialization area must be completed with the maximum grade of B. Courses below a B are not counted toward degree requirements, but such grades will be counted in calculating a student’s grade point average.

Undergraduate Course Descriptions

School of Informatics (INFO)

The abbreviation “P” refers to the course prerequisite or prerequisites. The number of hours of credit given for a course is indicated in parentheses following the course title.

1101 Introduction to Informatics (3 cr.)

P: computer literacy. Emphasis on topics in human computer interaction and human factors; collaborative technologies; group problem solving; ethics, privacy, and ownership of information and information sources; information representation and the information life cycle; the transformation of data to information; and futuristic thinking.

1110 Basic Tools of Informatics I—Programming Concepts (1.5 cr.)

P: CSI A110, CSI A111, or equivalent computing experience. Introduction to programming for users of computer systems. Emphasis on problem-solving techniques. An eight-week lecture and laboratory course. Cross-listed with CSI A112. Credit given for only one of the following: INFO I110, CSI A112, or INFO I112.

1111 Basic Tools of Informatics II—Introduction to Databases (1.5 cr.)

P: CSI A110, CSI A111, or equivalent computing experience. Introduction to database design concepts. Entering and modifying data, accessing data using visual tools and SQL, building database applications using forms and application development tools. Emphasis on problem-solving techniques. An eight-week lecture and laboratory course. Cross-listed with CSI A114. Credit given for only one of the following: INFO I111, CSI A114, or INFO I112.

1112 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 lecturer will discuss general concepts and syntax. The lab will focus on the use of software, including a programming language, modifying and accessing data using visual tools, and building database applications using forms and development tools. Lecture and laboratory. Offered on the IUPUI campus only. Equivalent to the combination of INFO I110 and INFO I111. Credit given for INFO I112 and either INFO I110 or INFO I111.

1200 Information Representation (3 cr.)

P: knowledge of a programming language as can be obtained from INFO I110, INFO I121, or similar courses. Recommended prerequisite or concurrent: INFO I120. The basic structure of information representation in social and scientific applications. Representational structures and approaches from many disciplines are introduced: philosophical theories of classification and categorization; information access and representation on the World Wide Web; object-oriented design and relational databases; AI knowledge representation and discovery. Cross-listed with COGS Q200. Credit given for either INFO I120 or COGS Q200.

1201 Mathematical Foundations of Informatics (4 cr.)

Recommended prerequisite or concurrent: INFO I110. An introduction to the suite of mathematical and logical tools used in information sciences, including finite mathematics, automata and computability theory, elementary probability and statistics, and basics of classical information theory. Cross-listed with COGS Q250. Credit given for either INFO I120 or COGS Q250.

1202 Social Informatics (3 cr.)

P: INFO I110. Introduces the social and behavioral foundations of informatics. Theoretical approaches to how technology is used from psychological and sociotechnical perspectives. Examples of how current and emerging technologies such as games, e-mail, and electronic commerce are affecting daily lives, social relations, work, and leisure time.

1210 Information Infrastructure I (4 cr.)

Recommended prerequisite or concurrent: INFO I110. The software architecture of information systems. Basic concepts of systems and applications programming. Cross-listed with CSI A201. Credit given for only one of the following: INFO I120, CSI N331 (IUPUI), or CSI A201 (IUB).

1211 Information Infrastructure II (4 cr.)

P: INFO I120. The systems architecture of distributed applications. Advanced programming, including an introduction to the programming of graphical user interfaces. Cross-listed with CSI A202. Credit given for only one of the following: INFO I121, CSI N345 (IUPUI), CSI A202 (IUB), or CSI C212 (IUB).

1300 Human Computer Interaction (3 cr.)


1303 Organizational Informatics (3 cr.)

P: INFO I110. 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 redefining role of information technology, the changing character of work life and organizational practices, sociotechnical structures, and the rise and transformation of information-based industries. Credit given for either INFO I303 or SPEA V369.

1310 Multimedia Arts: History, Criticism, and Technology (3 cr.)

This course studies how the paradigm shift to a digital world will affect humanity. The course will consider the evolution of media arts and its underlying principles of communications. Students will study application development paradigms in current practice. Readings, lectures, class discussions, and research papers.

1320 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.

1400 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.

1420 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.

1450/451 Design and Development of an Information System (3-3 cr.)

P: INFO I211. 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 multimedia performance or exhibit, or design and implementation of a simulated environment (virtual reality).

1460/461 Senior Thesis (3-3 cr.)

P: senior standing and approval of the dean. The senior student prepares and presents a thesis: a substantial, typically multichapter paper based on a well-planned research or scholarly project, as determined by the student and a sponsoring faculty member.

1499 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.

New Media Program, IUPUI (NEWM)

The abbreviation “P” refers to the course prerequisite or prerequisites. The number of hours of credit given for a course is indicated in parentheses following the course title.

N100 Introduction to Digital Media Principles (3 cr.)

The development of interactive multimedia requires principles garnered from a variety of disciplines. Through readings, critiques, exercises and discussion, students will explore what makes an interactive multimedia application successful and what types of applications are best suited to interactive multimedia. This course provides an introduction to the design of interactive multimedia drawing upon user interface design, task analysis, analysis of audience characteristics, and usability testing, as well
as design and editing principles from animation and video production.

N101 Topics in Interactive Multimedia (3 cr.) P: NEWM N100. Interactive multimedia is a rapidly evolving field that is significantly influenced by changes in theory, storage media, computing hardware, authoring/presentation software and communication capabilities in disciplines such as music, art, and journalism. Students will be exposed to recent trends through the development of interactive media projects for use on multiple platforms, the Internet, and CD-ROM.

N110 Visualizing Information (3 cr.) A course to sketch visualization: perspective, projection, and actually “seeing” the world around us. The projects will be using traditional media in the beginning and then computer shading, shadows, and lighting.

N175 Digital Media I: Vector Imaging (3 cr.) P: NEWM N101. Vector graphics are produced using traditional visual languages (sketches) and computer methods. Color theory, geometric construction, and rendering techniques are utilized in vector-based graphic creation for use in new media applications (Illustrator).

N180 Digital Media II: Raster Imaging (3 cr.) P: NEWM N101. Raster graphics are produced using traditional visual languages (sketches) and computer methods. Topics will include image composition, realistic representation, digital imaging for new media, color mode and palette usage, material and value representation (Photoshop).

N200 Desktop Tools for Digital Media (3 cr.) P: NEWM N101. An introduction to the principles of multimedia creation and digital effects. The class will focus on a number of different software programs including Adobe Premiere, Director Authorware, Adobe Photoshop, SoftImage 3D, Houdini, Kodak Cineon, and 3D Studio Max. Authoring, video, and sound editing computer applications, as well as cyberspace protocols and language are engaged.

N201 Design Issues in Digital Media (3 cr.) P: N101. Introductory course that will equip students with strategies in assembling visuals applicable to any medium. It will explore composition strategies; visual literacy and awareness; and principles of the visual display of quantitative information. The course will begin with traditional visual media and move into digital forms to give the student an awareness and sensibility to work in any medium. Projects, lectures, discussion, and writing assignments serve as a survey of best practice.

N204 Introduction to Interactive Media (3 cr.) P: NEWM N101. The creation of interactive multimedia products for multimedia 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 practical applications for interactive multimedia (Director).

N210 Introduction to Digital Sound (3 cr.) P: NEWM 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 effects techniques for animation (Soundforge and Cool Edit 16).

N215 Online Document Development (5 cr.) P: NEWM N101. An introductory course for the creation, publication, and management of documents and images for online distribution. Topics include an introduction to Web site development, portable document formats, online publishing, document conversion, file exchanges, and image preparation (Dreamweaver).

N230 Introduction to Game Design and Development (3 cr.) P: NEWM N101, NEWM N175, NEWM N180. An introduction course to "video" game design and development for entertainment. Topics include game theory, design and development of computer-based games, current game delivery systems and software, the commercial development cycle, case studies of current games, ethical issues including the current game rating system, emerging technical developments in game development, and current game trends. Students will develop new levels of existing games.

N235 Introduction to Computer Simulation/Animation (3 cr.) P: NEWM 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 (3D Studio Max).

N240 Introduction to Digital Video (3 cr.) P: NEWM N101. An introductory course covering applied video technologies for digital media production and introducing the basics of equipment associated with analog and digital video production. Designed for students interested in the use of design, time, and motion study; surface texture mapping; lighting; color; and the technology required to produce video for commercial applications in manufacturing design, marketing, training, gaming, Web creation, and entertainment (Adobe Premiere).

N250 Team Building in Technology (3 cr.) P: NEWM N101. This methods course helps students improve their effectiveness in solving problems and expand their critical thinking when working in groups. This course is practical in orientation, including the interpersonal process, decision-making styles, problem-solving concepts and procedures, the creative effort, conflict resolution, leadership, and assessment. Students develop projects with objectives, requirements, and constraints; client requests and implementation of the design solution. They execute the design plan and evaluate the final project.

N295 Career Enrichment Cooperative (3 cr.) P: 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 is required.

N300 Digital Media Production (3 cr.) P: NEWM N101. This is an advanced course demanding innovative design and technical skills to meet systematic studio work on complex computational undertakings. From this base, students conceive, observe, and analyze multimedia and cyber-communication projects. Students learn digital skills and tools through lectures and hands-on experimentation, including creative process and evaluation. Combines the production of journalism, music composition, and animation/simulation, with computer transmission of imaging, sound, and video.

N302 Media Simulation Methods (3 cr.) P: NEWM 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.

N304 Interactive Media Applications (3 cr.) P: NEWM 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 microprogramming; synchronization of input/output operations with interface design (Director 2).

N311 The Digital Paradigm Shift: Effects in International Cultures and Society (3 cr.) This course teaches how the paradigm shift to a digital world will affect international cultures and societies. A study of the major paradigm shifts in reference to culture and society as well as the effect for the future for humanity as a culture. Readings, lectures, class discussions, and papers with supported citations.

N315 Online Document Development II (3 cr.) P: NEWM 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 (Dreamweaver, Flash, DeBabilizer, Fireworks).

N330 Game Design, Development, and Production (3 cr.) P: NEWM N230. Advanced game development by producing interactive computer-based games. The process learned in N230 will be put into practice by developing a story, characters, programming, and an interactive game based on current trends in game development. Use of actual game development systems for current console gaming systems.

N335 Computer-Based Character Simulation/Animation II (3 cr.) P: NEWM N235. This course takes the basics of computer animation to the next level by including character animation. Topics include character development, modeling for character animation, 3D painting for custom texture, character animation techniques, and more advanced topics in relation to animation, such as particle systems (3D Studio Max, Bryce, 3D Painter).

Graduate Course Descriptions

School of Informatics

The abbreviation “P” refers to the course prerequisite or prerequisites. The number of hours of credit given for a course is indicated in parentheses following the course title.

INFO 1501 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 1502 Information Management (3 cr.)
P: INFO 1501. 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 semistructured medical/clinical/chemical/biological data sets.

INFO 1503 Social Impact of Information Technologies (3 cr.)
An overview of important social, legal, and ethical issues raised by information technology.

INFO 1590 Topics in Informatics (1-3 cr.)

Bioinformatics

BIOL L519 Bioinformatics: Theory and Application (3 cr.) Biosequence analysis, sequence alignment and assembly; RNA structure, protein, and molecular modeling; genomics and proteomics; gene and function discovery above the sequence level; phylogenetic analysis including parsimony, maximum likelihood, and related concepts; information and machine learning; artificial intelligence, neural networks, hidden Markov models; visual and graphical analysis in bioinformatics; worldwide biologic databases (use, management, analysis, federation, and access); experimental design and data collection techniques; scientific and statistical data analysis; database and data mining methods; networks and Internet methods.

BIOL L529 Bioinformatics in Molecular Biology and Genetics: Practical Applications (4 cr.)
Two semesters of programming experience or equivalent, knowledge of Unix operating system. Emphasis on problem solving with molecular biology data; biosequence analysis methods; practical software engineering in bioinformatics; methods in data collection, management, analysis and distribution; Internet client-server methods applied to genomic databases; lecture and laboratory.

INFO 1521 Seminar in Bioinformatics (1-3 cr.)
Presentation and discussion of new topics in bioinformatics as seminar by students. Concentration on a particular area each semester to be announced before registration.

INFO 1552 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.

INFO 1692 Thesis/Project in Bioinformatics (1-6 cr.)

Chemical Informatics

C571 Chemical Information Technology (3 cr.)
Chemical structure and data representation and search systems, bioinformatics, chemical information and database systems, laboratory information management systems, spectral and crystallographic databases, chemical reaction databases, patent information management systems, commercial chemical information databases, electronic chemical publishing systems.

C572 Computational Chemistry and Molecular Modeling (3 cr.)
Molecular modeling: 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. Statistics and chemometrics, multivariate statistics and experimental design, numerical methods, calibration and chemical analysis, optimization methods, artificial intelligence; molecular design, de novo design techniques; quantitative structure activity relationships (QSAR); comparative molecular field analysis; docking; molecular diversity and combinatorial libraries.
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INFO 1533 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.

INFO 1553 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.

INFO 1693 Thesis/Project in Chemical Informatics (1-6 cr.)

Health Informatics

INFO 1530 Seminar in Health Informatics Applications (3 cr.) Presents an overview of the various professional applications and research directions taken in health informatics. Requires directed laboratory experience.

INFO 1551 Seminar in Health Informatics (1-3 cr.)

INFO 1551 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.

INFO 1691 Thesis/Project in Health Informatics (1-6 cr.)

Human Computer Interaction (Fall 2003)

INFO 1534 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.

INFO 1554 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.

INFO 1694 Thesis/Project in Human Computer Interaction (1-6 cr.)

New Media Program

The abbreviation “P” refers to the course prerequisite or prerequisites. The number of hours of credit given for a course is indicated in parentheses following the course title.

NEWM N500 Foundations of Digital Arts Production (3 cr.) Examines foundations and principles of digital media production. Topics include: publishing electronic print media, written composition, methods, textbooks, multimedia, computer transmission of imaging, sound, and video. Other aspects covered are network and broadband media transmission, televideo and computer graphics, background audio, script credit approval, clearances, recording, and audio and video sampling. Also included is reproduction of sound and images, tools for digital media application development. Legal and ethical aspects regarding the protection of intellectual property, copyright, name-branding, business affairs, and live performances for the commercial media industry will be assessed.

NEWM N501 TPSC: Principles of Multimedia Technology (3 cr.) Examines current practices in the use of digital media technology with special emphasis in computer technology, library science, computer science, music, journalism, and art and design. Paradigms of applied research; implementation and resource allocation; assessment designs for specific production models; assessment of database-backend; study of current applications and concepts.

NEWM N502 Digital Media Motion and Simulation Methods (3 cr.) Applications in animation/simulation design and creation using computer desktop tools. Animation models for Web design. Internet applications, composite techniques, and instructional sequences will be developed. Skills will be developed through design and modeling of individual or team multidisciplinary projects.

NEWM N503 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 N504 Advanced Interactive Design Applications (3 cr.) P: NEWM N502. Incorporates extensive analysis and use of computer and multimedia authoring tools intended for distributed learning applications. Project management and programming team organization; media management and selection criteria for digital arts media development; task analysis and instructional sequencing applied to training and instruction; assessment modeling and feedback schedules for intrinsic motivation of students and trainees are examined.

NEWM N505 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 N506 Media Arts and Technology Project (5 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 a permanent archive.

NEWM N510 Web-Database Concepts (3 cr.) P: NEWM N503. Addresses diverse issues arising when designing World Wide Web interfaces. 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.

School of Informatics Administration, Faculty and Staff 2002-04

Administration

Dunn, J. Michael, Dean, Oscar R. Eveing Professor of Philosophy, Professor of Computer Science
Bailey, Darrell L., Executive Associate Dean, Director of Office of New Media, Associate Professor of Music
Perry, Douglas G., Associate Dean for Graduate Studies and Research, Associate Professor of Respiratory Therapy, Adjunct Associate Professor of Medicine

Faculty

Baldwin, Daniel, Assistant Professor
Defazio, Joseph, Assistant Professor
Faiola, Anthony, Associate Professor
Hook, Sara A., Professor of Dental Informatics, Associate Dean of the Faculties, and Librarian
Huang, Jeffrey, Assistant Professor of New Media and Assistant Professor of Computer and Information Science
Huckleberry, Donald, Research Associate
Koch, Clinton, Lecturer
Koch, Keith, Assistant Professor
Lipkowitz, Kenny B., Associate Director of Chemical Informatics and Professor of Chemistry
Mannheimer, Steve, Professor
McDaniel, Anna M., Director of Health Informatics, Associate Professor of Nursing, and Adjunct Associate Professor of Public Health
McDaniel, Matt, Lecturer
Milosevich, Sam A. Falk, Associate Professor of Informatics
Mukhopadhyay, Snehashis, Associate Director for Bioinformatics and Associate Professor of Computer and Information Science
Reed, Mary Ellen, Lecturer
Tennant, Susan, Clinical Assistant Professor

Staff

Hamilton, Tia, Senior Administrative Assistant
LeFevre, D.C., Webmaster and Media Designer
McCready, W. Mark, Assistant Dean
O’Neill, Mary, Senior Administrative Assistant
Ratts, David, Recorder
Ray, Dale, Administrative Assistant
Rondeau, Molly, Administrative Support Specialist