# Informatics, BS

The major in informatics provides students with the necessary training for employment in careers such as software development, user experience, and data analytics. It provides good preparation for graduate study in a variety of disciplines.

Students may declare a major in informatics when they are admitted to the university or afterward. All students begin the majors as Bachelor of Arts students but may switch to the Bachelor of Science program at any time.

The informatics major combines fundamental and practical computing knowledge with a choice of cognate area from the liberal arts and sciences, providing students with the necessary background and specialized skills to work at the interface of computing and another discipline. Students may begin the major without a chosen cognate area; they may declare a cognate at any time. Some cognates are available only with the Bachelor of Arts, while others are available only with the Bachelor of Science. A student's choice of cognate determines whether the student will earn a BA or a BS.

Informatics majors are advised at the Academic Advising Center until they have completed 30 s.h., at which point they are assigned a departmental advisor. Students being advised at the Academic Advising Center also can consult with an informatics faculty advisor.

Transfer students who have taken a course approved as equivalent to a required informatics or computer science course are exempt from that course. Transfer course grades are included in the informatics grade-point average.

Students should consult the Department of Computer Science website or visit the department's office for information about general policies, elective areas, internships, scholarships, and student groups, such as the university's chapter of the Association for Computing Machinery (ACM) and Women in Computing Sciences (WiCS).

Many informatics major courses are offered once per year and have prerequisites that are only offered annually. Speak with an advisor for more information.

## Advanced Placement

The Computer Science Advanced Placement (AP) exam may be used to satisfy requirements. See Advanced Placement Credit Policy on the Department of Computer Science website.

## Learning Outcomes

- Students can apply computational thinking approaches to solve problems.
- Students can individually and collaboratively develop software using professional tools.
- Students can extract, organize, analyze, and present data from a variety of sources.
- Students can contribute to the development of usable, useful, and enjoyable software applications by using human-centered methods.
- Students understand social, professional, and ethical issues related to computing.
- Students have a thorough understanding of a chosen cognate area.

## Requirements

The Bachelor of Science with a major in informatics requires a minimum of 120 s.h., including at least 55–59 s.h. of work for the major. Students must maintain a grade-point average of at least 2.00 in all courses for the major and in all UI courses for the major. A cumulative GPA of at least 2.00 is required for graduation. Students must also complete the College of Liberal Arts and Sciences GE CLAS Core.

The program combines foundational informatics coursework with coursework in a cognate area. The major offers the cognate areas of bioinformatics, medical informatics, and individualized cognates. Required credit for the major depends on a student's choice of cognate area.

Coursework for the major includes the informatics core, two electives, a statistics course, and a set of courses in the chosen cognate area. Work for the major may not be taken pass/nonpass. Students are expected to have taken MATH:1005 College Algebra or the equivalent.

Students who major in informatics may not also major in computer science, business analytics and information systems, or computer science and engineering. They may, however, earn a minor in computer science.

## Departmental Residency Requirement

Students must complete at least five courses (minimum of 15 s.h.) at the University of Iowa from the following: CS:3910 Informatics Project and four additional computer science courses (prefix CS) numbered 2500–4999; these courses are requirements for the BS in informatics as listed below.

## Program Requirements

The BS with a major in informatics requires the following coursework. Enrollment in many courses for the major requires a minimum grade of C-minus in prerequisite courses.

| Requirements | Hours |
| --- | --- |
| Informatics Core Courses | 19 |
| Informatics Electives | 6 |
| Statistics Course | 3 |
| Cognate Courses | 27-31 |

## Informatics Core

The informatics core consists of six required computing courses (19 s.h.) that emphasize data manipulation, databases, and networking. It provides more applications-oriented content than the traditional computer science curriculum yet is designed to offer students a sound basis in underlying computer science themes and techniques.

| Course # | Title | Hours |
| --- | --- | --- |
| All of these: | | |
| CS:1110 | Introduction to Computer Science | 3 |
| CS:2110 | Programming for Informatics | 4 |
| CS:2420 | Analyzing Data for Informatics | 3 |
| CS:2520 | Human-Computer Interaction for Informatics | 3 |

| | | |
|---|---|---|
| CS:2620 | Server-Side Development for Informatics | 3 |
| CS:3910 | Informatics Project | 3 |

# Informatics Electives

Students must complete at least 6 s.h. in two computer science courses (prefix CS) numbered 3000–4999, excluding CS:3910 and CS:4510; they may count up to 3 s.h. from CS:3990 Honors in Computer Science or Informatics. Course selection must be approved by an informatics advisor. Students may have additional choices from the Department of Electrical and Computer Engineering and the Department of Business Analytics; consult an informatics advisor for additional choices.

# Statistics Course

Students must complete one introductory statistics course. Some cognates require a specific statistics course. Students should consult with their advisors to choose a statistics course appropriate for their cognate area.

| Course # | Title | Hours |
|---|---|---|
| One of these: | | |
| STAT:2010 | Statistical Methods and Computing | 3 |
| STAT:3510 | Biostatistics | 3 |

# Cognates

Students must complete all requirements listed under one of the following cognate areas: bioinformatics, medical informatics, or an individualized cognate.

## Bioinformatics

The informatics major with the bioinformatics cognate requires a minimum of 58 s.h. of work for the major, including 30 s.h. in cognate courses. The bioinformatics cognate is intended for students interested in applications of computing to the biological sciences. It may lead to careers in laboratory research, biotechnology, data management, and other related areas. It may also prepare students for graduate programs in bioinformatics or genetics. Cognate courses are drawn primarily from biology and chemistry.

| Course # | Title | Hours |
|---|---|---|
| All of these: | | |
| BIOL:1411 | Foundations of Biology | 4 |
| BIOL:1412 | Diversity of Form and Function | 4 |
| CHEM:1110 | Principles of Chemistry I | 4 |
| CHEM:1120 | Principles of Chemistry II | 4 |
| BIOL:2512 | Fundamental Genetics | 4 |
| BIOL:3172 | Evolution | 4 |
| Two of these: | | |
| BIOL:2673 | Ecology | 3 |
| BIOL:3212 | Bioinformatics for Beginners | 3 |
| BIOL:3314 | Genomics | 3 |

## Medical Informatics

The informatics major with the medical informatics cognate requires a minimum of 56 s.h. of work for the major, including at least 28 s.h. in cognate courses. The medical informatics cognate is intended for students interested in applications of computing to health care, especially in a clinical setting. It may lead to careers in medical or hospital settings, graduate programs in medical informatics, or professional degree programs in medicine, dentistry, nursing, or other allied health professions. Cognate courses are drawn from biology, chemistry, health, sport, and human physiology, and public health.

Students who choose the medical informatics cognate must satisfy the major's statistics requirement with either STAT:2010 Statistical Methods and Computing or STAT:3510 Biostatistics.

| Course # | Title | Hours |
|---|---|---|
| All of these: | | |
| BIOL:1411 & BIOL:1412 | Foundations of Biology and Diversity of Form and Function | 8 |
| CHEM:1110 & CHEM:1120 | Principles of Chemistry I and Principles of Chemistry II | 8 |
| CHEM:2210 & CHEM:2220 | Organic Chemistry I and Organic Chemistry II | 6 |
| At least two of these: | | |
| BIOL:2512 | Fundamental Genetics | 4 |
| BIOL:3172 | Evolution | 4 |
| CHEM:2410 | Organic Chemistry Laboratory | 3 |
| HHP:2100 | Human Anatomy | 3 |
| HMP:4000 | Introduction to the U.S. Health Care System | 3 |

## Individualized Cognates

Students interested in developing individualized cognates may work with an informatics advisor. Individualized cognates may be drawn primarily from one department or an appropriate mix of departments; they require an approved set of cognate courses totaling 27–31 s.h.

# Early Admission to the Graduate College

Undergraduate informatics students who have 6 s.h. or less to earn toward graduation may apply for early admission to the Graduate College. Early admission allows students in their final undergraduate semester to take courses for graduate credit in addition to the courses they need to complete their bachelor's degrees.

## Combined Programs

# BS/MS in Informatics (Geoinformatics, Health Informatics, or Human-Computer Interaction Subprogram)

Students majoring in informatics who are interested in earning a master's degree in informatics may apply to the combined BS/MS program (bioinformatics or medical informatics subprogram) offered by the College of Liberal Arts and Sciences and the Graduate College. The program enables students to begin graduate-level study of informatics before they complete their bachelor's degree. Students are able to complete both degrees in less time than if they were to complete the two degrees separately.

Separate application to each degree program is required. Applicants must be admitted to both programs before they may be admitted to the combined degree program. For more information about the graduate degree program, see the MS in informatics (Graduate College) in the catalog.

## Honors

# Honors in the Major

Students majoring in informatics have the opportunity to graduate with honors in the major. They must maintain a minimum UI cumulative grade-point average (GPA) of 3.33 and a minimum major GPA of 3.50; additionally, students complete 4–6 s.h. of CS:3990 Honors in Computer Science or Informatics and submit an acceptable honors thesis or project. At any time, students can communicate to the computer science professional advisor that they have an honors interest and can have that designation placed on their academic record.

A student is responsible for finding a faculty member willing to supervise the honors project. The student can register for CS:3990 Honors in Computer Science or Informatics under the project supervisor's name once the faculty member approves the proposed project and a timetable for the work. Once that is accomplished, the student must then communicate with the Department of Computer Science honors director, who changes the student's status to denote the student is pursuing honors in the major. It is not necessary to have declared an honors interest before finding a thesis supervisor and beginning to pursue honors in the major, but the student must be coded as pursuing honors prior to completing the application for degree.

An honors project can be completed in one semester, but it usually takes two semesters to complete. In the final semester, a student must register for CS:3999 Computer Science or Informatics Honors Cohort. The honors thesis/project must be approved by the thesis supervisor and then submitted to the honors director who will give initial approval that the student can graduate with honors in the major. Final approval is given after final grades are submitted and all requirements are met. For more details regarding project requirements, see Honors in Computer Science on the department's website.

# University of Iowa Honors Program

In addition to honors in the major, students can pursue honors study and activities through membership in the University of Iowa Honors Program. Visit Honors at Iowa to learn about the university's honors program.

Membership in the UI Honors Program is not required to earn honors in the informatics major. However, the semester hours earned in CS:3990 Honors in Computer Science or Informatics can be used to partially satisfy the UI Honors requirement of 12 s.h. of experiential learning coursework.

For more information, contact the Department of Computer Science honors director.

## Career Advancement

Informatics graduates work in a broad range of market sectors, reflecting the interdisciplinary nature of the program and the large number of available cognates. Students will have technical skills along with a specialty area that can help them pursue a specific type of organization or interest field. Here are just a few of the areas that informatics graduates have pursued: software development, database and/or web administration, data analysis, software support (IT), user interface/user experience design (the human-computer interaction cognate is useful for this area), and health care information (the health informatics cognate is useful for this area).

A recent job placement survey indicates that more than 90% of University of Iowa informatics graduates have a job, are continuing education, or are not seeking employment within six months of graduation.

View post-graduation data on the Pomerantz Career Center website, which uses University of Iowa placement information to explore what recent informatics alumni are doing, including median salaries, job titles, companies of employment, and other facts about UI graduates.

The Pomerantz Career Center offers multiple resources to help students find internships and jobs.

## Academic Plans

# Four-Year Graduation Plan

The Four-Year Graduation Plan is not available to BS students majoring in informatics. Students work with their advisors on individual graduation plans.

# Sample Plans of Study

Sample plans represent one way to complete a program of study. Actual course selection and sequence will vary and should be discussed with an academic advisor. For additional sample plans, see MyUI.

## Informatics, BS

- Bioinformatics Track [p. 3]
- Medical Informatics Track [p. 4]

### Bioinformatics Track

| Course | Title | Hours |
|---|---|---|
| **Academic Career** | | |
| **Any Semester** | | |
| GE CLAS Core: Sustainability [a] | | |
| | **Hours** | **0** |
| **First Year** | | |
| **Fall** | | |
| CS:1110 | Introduction to Computer Science | 3 |
| CSI:1600 | Success at Iowa | 1 |
| CHEM:1110 | Principles of Chemistry I [b] | 4 |
| RHET:1030 or ENGL:1200 | Rhetoric: Writing and Communication or The Interpretation of Literature | 3 - 4 |
| GE CLAS Core: Understanding Cultural Perspectives [c] | | 3 |
| | **Hours** | **14-15** |
| **Spring** | | |
| CHEM:1120 | Principles of Chemistry II | 4 |
| ENGL:1200 or RHET:1030 | The Interpretation of Literature or Rhetoric: Writing and Communication | 3 |

| | | |
|---|---|---|
| Major: statistics requirement [d] | | 3 |
| Elective course [e] | | 3 |
| **Hours** | | **13** |
| **Second Year** | | |
| **Fall** | | |
| BIOL:1411 | Foundations of Biology | 4 |
| CS:2110 | Programming for Informatics [f] | 4 |
| GE CLAS Core: Social Sciences [c] | | 3 |
| GE CLAS Core: World Languages First Level Proficiency or elective course [g] | | 4 - 5 |
| Elective course [e] | | 1 |
| **Hours** | | **16-17** |
| **Spring** | | |
| BIOL:1412 | Diversity of Form and Function | 4 |
| CS:2420 | Analyzing Data for Informatics [h] | 3 |
| CS:2520 | Human-Computer Interaction for Informatics [h] | 3 |
| GE CLAS Core: International and Global Issues [c] | | 3 |
| GE CLAS Core: World Languages Second Level Proficiency or elective course [g] | | 4 - 5 |
| **Hours** | | **17-18** |
| **Third Year** | | |
| **Fall** | | |
| CS:2620 | Server-Side Development for Informatics [f] | 3 |
| GE CLAS Core: Historical Perspectives [c] | | 3 |
| GE CLAS Core: World Languages Third Level Proficiency or elective courses [g] | | 4 - 5 |
| Elective course [e] | | 3 |
| Elective course [e] | | 2 |
| **Hours** | | **15-16** |
| **Spring** | | |
| BIOL:2512 | Fundamental Genetics | 4 |
| Major: advanced informatics elective [i] | | 3 |
| GE CLAS Core: Literary, Visual, and Performing Arts [c] | | 3 |
| GE CLAS Core: World Languages Fourth Level Proficiency or elective course [g] | | 4 - 5 |
| Elective course [e] | | 2 |
| **Hours** | | **16-17** |
| **Fourth Year** | | |
| **Fall** | | |
| BIOL:3172 | Evolution | 4 |
| Major: advanced informatics elective [i] | | 3 |
| GE CLAS Core: Values and Society [c] | | 3 |
| Elective course [e] | | 3 |
| Elective course [e] | | 2 |
| **Hours** | | **15** |
| **Spring** | | |
| CS:3910 | Informatics Project [h] | 3 |
| Major: advanced biology elective [j] | | 3 |
| Major: advanced biology elective [j] | | 3 |
| Elective course [e] | | 3 |
| Elective course [e] | | 3 |

| | |
|---|---|
| Degree Application: apply on MyUI before deadline (typically in February for spring, September for fall) [k] | |
| **Hours** | **15** |
| **Total Hours** | **121-126** |

a  Sustainability must be completed by choosing a course that has been approved for Sustainability AND for one of these General Education areas: Natural Sciences; Quantitative or Formal Reasoning; Social Sciences; Historical Perspectives; International and Global Issues; Literary, Visual, and Performing Arts; or Values and Society.

b  Enrollment in chemistry courses requires completion of a placement exam.

c  GE CLAS Core courses may be completed in any order unless used as a prerequisite for another course. Students should consult with an advisor about the best sequencing of courses.

d  Choose from STAT:2010 or STAT:3510.

e  Students may use elective courses to earn credit towards the total s.h. required for graduation or to complete a double major, minors, or certificates.

f  Typically this course is offered in fall semesters only. Check MyUI for course availability since offerings are subject to change.

g  Students who have completed four levels of a single language or two levels of two different languages in high school or college have satisfied the GE CLAS Core World Languages requirement. Students who have completed three levels of a single language may complete a fourth-level course in the same language or may choose an approved World Language and Cultural Exploration course. Enrollment in world languages courses requires a placement exam, unless enrolling in a first-semester-level course. Contact your academic advisor or CLAS Undergraduate Programs Office with questions concerning the World Languages requirement.

h  Typically this course is offered in spring semesters only. Check MyUI for course availability since offerings are subject to change.

i  Computer science course (prefix CS) numbered 3000-4999, including CS:3990 for 3 s.h., but excluding CS:3910 and CS:4510.

j  Students must choose from BIOL:2673, BIOL:3212, or BIOL:3314.

k  Please see Academic Calendar, on Office of the Registrar website, for current degree application deadlines. Students should apply for a degree for the session in which all requirements will be met. For any questions on appropriate timing, contact your academic advisor or Degree Services.

## Medical Informatics Track

| Course | Title | Hours |
|---|---|---|
| **Academic Career** | | |
| **Any Semester** | | |
| GE CLAS Core: Sustainability [a] | | |
| **Hours** | | **0** |
| **First Year** | | |
| **Fall** | | |
| CS:1110 | Introduction to Computer Science | 3 |
| CHEM:1110 | Principles of Chemistry I [b] | 4 |

| | | |
|---|---|---|
| RHET:1030 or ENGL:1200 | Rhetoric: Writing and Communication or The Interpretation of Literature | 3 - 4 |
| GE CLAS Core: Understanding Cultural Perspectives [c] | | 3 |
| CSI:1600 | Success at Iowa | 1 |
| | **Hours** | **14-15** |
| **Spring** | | |
| CHEM:1120 | Principles of Chemistry II | 4 |
| ENGL:1200 or RHET:1030 | The Interpretation of Literature or Rhetoric: Writing and Communication | 3 - 4 |
| Major: statistics requirement [d] | | 3 |
| Elective course [e] | | 3 |
| | **Hours** | **13-14** |
| **Second Year** | | |
| **Fall** | | |
| BIOL:1411 | Foundations of Biology | 4 |
| CS:2110 | Programming for Informatics [f] | 4 |
| GE CLAS Core: Social Sciences [c] | | 3 |
| GE CLAS Core: World Languages First Level Proficiency or elective course [g] | | 4 - 5 |
| Elective course [e] | | 2 |
| | **Hours** | **17-18** |
| **Spring** | | |
| CS:2420 | Analyzing Data for Informatics [h] | 3 |
| CS:2520 | Human-Computer Interaction for Informatics [h] | 3 |
| BIOL:1412 | Diversity of Form and Function | 4 |
| GE CLAS Core: World Languages Second Level Proficiency or elective course [g] | | 4 - 5 |
| Elective course [e] | | 2 |
| | **Hours** | **16-17** |
| **Third Year** | | |
| **Fall** | | |
| CS:2620 | Server-Side Development for Informatics [f] | 3 |
| GE CLAS Core: Historical Perspectives [c] | | 3 |
| GE CLAS Core: International and Global Issues [c] | | 3 |
| GE CLAS Core: World Languages Third Level Proficiency or elective course [g] | | 4 - 5 |
| Elective course [e] | | 3 |
| | **Hours** | **16-17** |
| **Spring** | | |
| CHEM:2210 | Organic Chemistry I | 3 |
| Major: advanced informatics elective [i] | | 3 |
| GE CLAS Core: Literary, Visual, and Performing Arts [c] | | 3 |
| GE CLAS Core: World Languages Fourth Level Proficiency or elective course [g] | | 4 - 5 |
| Elective course [e] | | 3 |
| | **Hours** | **16-17** |
| **Fourth Year** | | |
| **Fall** | | |
| CHEM:2220 | Organic Chemistry II | 3 |
| Major: advanced informatics elective [i] | | 3 |
| GE CLAS Core: Values and Society [c] | | 3 |
| Elective course [e] | | 3 |

| | | |
|---|---|---|
| Elective course [e] | | 3 |
| | **Hours** | **15** |
| **Spring** | | |
| CS:3910 | Informatics Project [h] | 3 |
| Major: advanced science elective [j] | | 3 |
| Major: advanced science elective [j] | | 3 |
| Elective course [e] | | 3 |
| Elective course [e] | | 3 |
| Degree Application: apply on MyUI before deadline (typically in February for spring, September for fall) [k] | | |
| | **Hours** | **15** |
| | **Total Hours** | **122-128** |

a Sustainability must be completed by choosing a course that has been approved for Sustainability AND for one of these General Education areas: Natural Sciences; Quantitative or Formal Reasoning; Social Sciences; Historical Perspectives; International and Global Issues; Literary, Visual, and Performing Arts; or Values and Society.

b Enrollment in chemistry courses requires completion of a placement exam.

c GE CLAS Core courses may be completed in any order unless used as a prerequisite for another course. Students should consult with an advisor about the best sequencing of courses.

d Choose from STAT:2010 or STAT:3510.

e Students may use elective courses to earn credit towards the total s.h. required for graduation or to complete a double major, minors, or certificates.

f Typically this course is offered in fall semesters only. Check MyUI for course availability since offerings are subject to change.

g Students who have completed four levels of a single language or two levels of two different languages in high school or college have satisfied the GE CLAS Core World Languages requirement. Students who have completed three levels of a single language may complete a fourth-level course in the same language or may choose an approved World Language and Cultural Exploration course. Enrollment in world languages courses requires a placement exam, unless enrolling in a first-semester-level course. Contact your academic advisor or CLAS Undergraduate Programs Office with questions concerning the World Languages requirement.

h Typically this course is offered in spring semesters only. Check MyUI for course availability since offerings are subject to change.

i Computer science course (prefix CS) numbered 3000-4999, including CS:3990 for 3 s.h., but excluding CS:3910 and CS:4510.

j Choose from BIOL:2512, BIOL:3172, CHEM:2410, HHP:2100 or HMP:4000.

k Please see Academic Calendar, on Office of the Registrar website, for current degree application deadlines. Students should apply for a degree for the session in which all requirements will be met. For any questions on appropriate timing, contact your academic advisor or Degree Services.