BIOINFORMATICS: INFORMATION SCIENCES, MS

for the degree of Master of Science in Bioinformatics, Information Sciences Concentration

A typical student will take 6 required courses (24 hours) 1 Biology, 1 Computer Science, 1 Fundamental Bioinformatics, and 3 Information Sciences. The student must then choose 3 courses (12 hours) of electives to complete the degree. It is strongly encouraged that up to 2 courses of these electives (8 hours) are thesis. Our expectation is that each student will arrange a custom program of study, suitable for the information management of their particular biological informatics application. Currently, this program requires students to be in residence in Champaign-Urbana.

The School of Information Sciences (iSchool) offers programs of study leading to the Master of Science (M.S.), the Certificate of Advanced Study (C.A.S), and the Doctor of Philosophy degrees. Three Master of Science (M.S.) degrees are available. The M.S. in Library and Information Science (L.I.S.) prepares students for professional careers in all types of information organizations, including libraries. The M.S. in Information Management (I.M.) will prepare the students for information-intensive professional roles in a broad range of sectors. The Information Sciences concentration of the campus-wide M.S. in bioinformatics program emphasizes multidisciplinary skills that are required for a career developing and managing information systems for the biological sciences community. The C.A.S. program provides the opportunity

1. to study an aspect of information sciences in greater depth than is possible in the M.S. program,
2. to refresh and upgrade one's professional training several years after completing a M.S. program, or
3. to redirect one's career into a different area of library and information science.

School Librarian Licensure is available in conjunction with both the M.S. in L.I.S. and C.A.S. The Ph.D. is a research degree program.

Admission
The general admission requirements of the Graduate College apply. Consideration is also given to language study and computer skills, relevant work experience, letters of reference, and evidence of leadership. International students must score at least 620 on the paper-based Test of English as a Foreign Language (TOEFL) (260 on the computer-based test; 104 on the iBT version); or 7 on each section of the IELTS. The M.S. in bioinformatics requires a strong background in information science including undergraduate-level computing and mathematics. The C.A.S. requires a master's degree in library and information science and a grade point average of at least 3.0 (A = 4.0) in the master's program.

School Librarian Licensure
Candidates interested in the School Librarian Licensure program must first be admitted and enrolled as a degree-seeking student within the School of Information Sciences before their application to the School Librarian Licensure program is reviewed. Accepted students must successfully pass two Illinois State Board of Education testing requirements prior to registration for the final fieldwork experience.

Graduate Teaching Experience
Although teaching is not a general Graduate College requirement, experience in teaching is considered an important part of the graduate experience in the Ph.D. program for those interested in faculty careers.

Facilities and Resources
Among the major areas of faculty research are:

- community informatics
- data analytics
- data curation
- digital humanities
- digital libraries
- history of information
- information retrieval
- organization of knowledge and information
- privacy, security, and trust
- ethics and values for information
- youth literature, culture, and services

The iSchool's Center for Informatics Research in Science and Scholarship (CIRSS) conducts research on information problems that impact scientific and scholarly inquiry. The Center for Children's Books (CCB) provides a review and research collection of the newest literature for children and young adults. The Communications Office produces two high-quality publications, Library Trends and The Bulletin of the Center for Children's Books. The staff of each of these units is available to students and faculty for consultation and guidance. A computer network with Internet connectivity is integral to teaching and learning activities. The University Library provides a vast reservoir of resources for all types of study and research in library and information science.

The School maintains an ongoing commitment to continuing education through conferences, institutes, workshops, and course offerings.

Financial Aid
Financial aid may be available from the iSchool, the University Library, and elsewhere in the University in the form of graduate assistantships, teaching assistantships, research assistantships, and hourly paid work. Area libraries may provide pre-professional or hourly positions. Also, the iSchool offers a limited number of fellowships for which doctoral students tend to be favored over C.A.S. and master's degree students. Students in the joint program that do not hold a FLAS fellowship are eligible for, but not guaranteed, fellowship or assistantship support in the semesters in which they are enrolled in the iSchool. Any assistantship awarded to these students provides a waiver of the base in-state tuition and service fee as well as a stipend. Non-Illinois residents must pay the difference between in- and out-of-state tuition.

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For additional details and requirements, refer to the unit's Graduate Programs of Study (https://ischool.illinois.edu/degrees-programs/) and the Graduate College Handbook (https://grad.illinois.edu/gradhandbook/).

Thesis or Non Thesis Option

Code	Title	Hours
Computer Science and Informatics (choose one)		4
CS 411	Database Systems	
CS 466	Introduction to Bioinformatics	
CS 473	Algorithms	
CPSC 565	Perl & UNIX for Bioinformatics	
IS 455	Database Design and Prototyping	
IS 507	Data, Statistical Models and Information	
STAT 428	Statistical Computing	
STAT 440	Statistical Data Management	
STAT 448	Advanced Data Analysis	
STAT 480	Big Data Analytics	
STAT 525	Topics in Computational Statistics	
Fundamental Bioinformatics (choose one)		4
ANSC 542	Applied Bioinformatics	
ANSC 545	Statistical Genomics	
CHBE 571	Bioinformatics	
CPSC 567	Bioinformatics & Systems Biol	
CS 466	Introduction to Bioinformatics	
IB 467	Principles of Systematics	
MCB 432	Computing in Molecular Biology	
Biology (choose one)		4
ANSC 441	Human Genetics	
ANSC 444	Applied Animal Genetics	
ANSC 446	Population Genetics	
BIOP 401	Introduction to Biophysics	
BIOP 550	Biomolecular Physics	
CPSC 452	Advanced Plant Genetics	
CPSC 466	Genomics for Plant Improvement	
CPSC 554	Quantitative Genetics and Genomics	
CPSC 563	Chromosomes	
CPSC 566	Plant Gene Regulation	
MCB 400	Cancer Cell Biology	
MCB 450	Introductory Biochemistry	
MCB 501	Advanced Biochemistry	
MCB 502	Advanced Molecular and Cell Biology	

Code	Title	Hours
Choose One (1) course from each of the following areas:		
Data Stewardship		
IS 455	Database Design and Prototyping	
IS 515	Information Modeling	
IS 537	Theory & Practice of Data Cleaning	
IS 543	Digital Preservation	
IS 547	Foundations of Data Curation	
IS 575	Metadata in Theory & Practice	
Data Analytics		
IS 407	Introduction to Data Science	
IS 445	Data Visualization	
IS 507	Data, Statistical Models and Information	
IS 527	Network Analysis	
IS 557	Applied Machine Learning: Team Projects	
IS 567	Text Mining	
IS 577	Data Mining	
System Policy & Design		
IS 419	Entrepreneurial Information Technology Design	
IS 445	Data Visualization	
IS 504	Sociotechnical Information Systems	
IS 584	Advanced Topics in Ethics and Privacy (Privacy in the Internet Age)	
IS 586	Usability Engineering	
IS 594	Advanced Topics in Management and Policy (Information Policy)	
Electives		**12**
IS 424	Social Computing	
IS 464	Information Assurance	
IS 517	Methods of Data Science	
IS 571	Advanced Topics in Use and Users of Information (Info Services for Diverse Users)	
INFO 591	Grad Bioinformatics Seminar	
For Thesis Option up to 8 hours:		
IS 599	Thesis Research	
Total Hours		**36**

Other Requirements

Code	Title	Hours
Other requirements may overlap		
A concentration is required.		
Minimum 500-level Hours Required Overall:		12
Minimum GPA:		3.0

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

1. Manage health, medical, and bio-informatics information using best practices in data stewardship; data science and data analytics; and human-centered design and systems.
2. Define and successfully address a tractable research question or real-world problem in health, medical, and bio-informatics using the appropriate scientific and/or research methods.
3. Accurately convey the implications of analytical results (in both oral and written modalities) to diverse stakeholders.
4. Maintain the highest level of ethical standards.
5. Apply best practices for providing value, leadership and team building in health, medical, and bio-informatics.

6. Stay up-to-date by learning how to read, analyze, discuss, synthesize, and critique advances reported in the health, medical, and bio-informatics research literature.

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Graduate Degree Programs in the School of Information Science

- Degree Programs
  - Bioinformatics: Information Sciences, MS (p. 1) (on campus & online)
  - Information Management, MS (http://catalog.illinois.edu/graduate/is/information-management-ms/) (on campus & online)
  - Library & Information Science, MS (http://catalog.illinois.edu/graduate/is/library-information-science-ms/) (on campus & online)
  - Library & Information Science, CAS (http://catalog.illinois.edu/graduate/is/library-information-science-cas/) (on campus & online)
  - Information Sciences, PhD (http://catalog.illinois.edu/graduate/is/information-science-phd/)
- Concentration:
  - Writing Studies (http://catalog.illinois.edu/graduate/las/concentration/writing-studies/)
- Joint Degree Programs:
- Library & Information Science, MS and African Studies, MA (http://catalog.illinois.edu/graduate/is_las/joint-degree/african-studies-ma-library-information-science-ms/)
- Library & Information Science, MS and History, MA (http://catalog.illinois.edu/graduate/is_las/history-ma-library-information-science-ms/)
- Library & Information Science, MS and Russian, East European, & Eurasian Studies, MA (http://catalog.illinois.edu/graduate/is_las/joint-degree/african-studies-ma-library-information-science-ms/)

School Librarian Licensure: available in conjunction with both the MS in LIS and CAS in LIS

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School of Information Sciences
Dean: Eunice Santos
Program contact: Katrina Hagler
School of Information Sciences website (https://ischool.illinois.edu/)
iSchool Faculty (https://ischool.illinois.edu/people/faculty/)
501 East Daniel Street, Champaign, IL 61820-6211
(217) 244-3432, (800) 982-0914 (within the US)
ischool email (ischool-apply@illinois.edu)

Overview of MS in Bioinformatics requirements (https://ischool.illinois.edu/degrees-programs/ms-bioinformatics/apply/)