

Proposal for a Graduate School of Library and Information Science (GSLIS) Concentration Within the Master of Science (MS) in Bioinformatics

EP.07.28

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Brief Description

The Graduate School of Library and Information Science (GSLIS) proposes to establish a graduate concentration within the campuswide M.S. in Bioinformatics. Consistent with the philosophy of the Bioinformatics Steering Committee, GSLIS defines "bioinformatics" as the management of biological information of all types. The GSLIS concentration will be an entirely separate program from the existing GSLIS M.S. degree; students may not be simultaneously admitted to both programs, and the new concentration will not be accredited by the American Library Association.

Justification for a GSLIS Concentration for the M.S. in Bioinformatics

GSLIS at the University of Illinois has long been ranked the number one Master's program in Library and Information Science in the country. The large professional program currently supports 440 M.S. students, including 190 taking a full degree across the Internet via the LEEP option. We are thus experienced with large professional M.S. programs. Current faculty are international experts in many areas of information management, including bioinformatics.

Library and Information Science (LIS) as a discipline has emphasized the use of information technology to support new approaches to the organization of and access to information. In recent years, some highly-ranked LIS schools have developed increasing emphasis on biological and medical information. For example, the University of North Carolina at Chapel Hill School of Information and Library Science offers a certificate of specialization in Bioinformatics.

The LIS orientation on Bioinformatics is applied, in building and evaluating systems, which mediate effectively between users and collections. The GSLIS concentration within the Bioinformatics program will emphasize the range of library and information science including: collection development, classification schemes, information retrieval, knowledge representation, user evaluation, and policy standards. Our students will be educated to develop information management systems in biological applications, with opportunities to consider a broad spectrum of domains including molecular biology, environmental ecology, and biomedicine.

A concentration within the M.S. in Bioinformatics is thus a natural fit for an LIS school, as a professional school specializing in information management and systems. LIS schools are long accustomed to providing flexible study for a wide variety of applications, and to placing M.S. graduates in suitable professional positions. The market for LIS Bioinformatics graduates would include medical and health industries, libraries and museums, information and computer industries, scientific research laboratories, and policy and service organizations.

GSLIS Concentration Prerequisites

Students are assumed to have strong backgrounds in information science, including undergraduate computing and mathematics at the level of the following courses. This level of background is necessary to take the required core courses, and must be remediated without credit if lacking. Appropriate preparation is also required in the chosen biology area of application.

- CS 225 (Data Structures) and introductory programming (LIS 452, CS 400)
- MATH 225 (Matrix Theory) and introductory statistics (STAT 100, PSYC 235)

Degree Requirements

The GSLIS concentration for the M.S. degree in Bioinformatics will require 36 hours of course work, either with 36 hours of core required and elective courses or with 28 hours of core required and elective courses plus 8 hours of thesis work. At least 12 hours must be at the 500 graduate level.

GSLIS will establish a permanent committee for admission to and oversight of the Bioinformatics M.S. This committee will review the suitability of each student's program of study, including any necessary remediation in biology or computing.

To satisfy the campus core requirements, one (1) course must be taken from each of the three (3) Core Areas: Biology, Computer Science, and Fundamental Bioinformatics. All such core courses must be approved by the campus Bioinformatics Steering Committee.

Biology: For the Biology core, a student must take a core course in a biology department. The course and department will depend on the student's area of emphasis in bioinformatics. The required Biology course for our concentration will be selected from among the existing Biology core courses in the campus wide M.S. in Bioinformatics.

Computer Science: For the Computer Science core, our emphasis is on information management. We will require CS 411 Database Systems that is already part of the approved campus core and will thus fulfill that requirement.

Fundamental Bioinformatics: For the Fundamental Bioinformatics core, the course and department will depend on the student's area of emphasis. For our planned new applications, additional core bioinformatics courses will be needed. We request that a course in Integrative Biology be added to the Fundamental Bioinformatics core. This will be supportive of existing GSLIS research projects in bioinformatics and our planned area of emphasis in ecological informatics. We are also developing new courses in healthcare informatics and in ecological informatics at a level suitable for students campus-wide; these will be submitted to the Bioinformatics Steering Committee at a later date. In the meantime, the required course for the GSLIS concentration will be selected from:

CHBE 571/ANSC 543/MCB 571/STAT 530 Bioinformatics *or*

ANSC 542/CPSC 569 Applied Bioinformatics *or*

IB 467 Principles of Systematics

In addition, GSLIS will require one (1) four-hour course in three of the following four (4) areas:

Information Organization and Knowledge Representation

LIS 551 Interfaces to Information Systems

LIS 575 Indexing and Abstracting

LIS 590DM Document Modeling

LIS 590RO Representing and Organizing Information Resources

LIS 590TR Information Transfer and Collaboration in Science

LIS590ON Ontologies in Natural Science

Information Resources, Uses and users

LIS 503 Use and Users of Information

LIS 522 Information Sources in the Sciences

Information Systems

LIS 456 Information Storage and Retrieval
LIS 509 Building Digital Libraries
LIS 556 Implementation of Information Retrieval Systems
LIS 566 Architecture of Network Information Systems
LIS 590EP Electronic Publishing

Disciplinary Focus

LIS 530B Health Sciences Information Services and Resources
LIS 590HI Healthcare Informatics (Healthcare Infrastructure)
LIS 590EI/BDI Ecological Informatics (Biodiversity Informatics)

A typical student will thus take 6 required courses (24 hours) – 1 Biology, 1 Computer Science, 1 Fundamental Bioinformatics, and 3 GSLIS. 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.

A recommended list of electives is given below. Our expectation is that each student will arrange a custom program of study, suitable for the information management of their particular bioinformatics application.

Recommended Elective Courses for GSLIS Concentration*Computer Science*

CS 410 Text Processing Algorithms (joint with LIS)
CS 413 Introductory Combinatorics
CS 446 Machine Learning
CS 511 Design of Database Systems
CS 512 Data Mining

Other Departments

EPSY/PSYC 594 Multivariate Analysis
STAT 400 Introductory Statistics
PSYC 509 Multidimensional Scaling
UP 519 Spatial Analysis with GIS

Biology

IB 441 Plant Ecology
IB 452 Ecosystem Ecology
IB 462 Mammal Classification and Evolution
IB 468 Insect Classification and Evolution
CHLH 421 Health Data Analysis
CHLH 474 Principles of Epidemiology (VP 517)
CHLH 527 Statistics in Epidemiology
CHLH 590 Biostatistics

Expected Enrollment

We expect 20 new students will enter the GSLIS concentration each year and that the time to graduation will be three to four semesters, depending on whether they do a thesis or need to take additional courses to remediate gaps in their preparation. Our current 40-hour M.S. degree can be finished within two semesters and a summer, but often takes additional time, depending on what background must be remediated without credit.

Budgetary and Staffing Implications

Additional staff and dollars needed

Initially, our proposal relies only on existing courses, so no new instructional resources are needed. However, staffing the bioinformatics applications will require new course development, although in active areas of faculty research. The LIS field is moving in directions strongly related to the needs of bioinformatics applications, so we expect to be able to support the needed course offerings in this concentration. As part of our new post-master's Certificate of Advanced Study (CAS) concentration in Digital Libraries, we will be developing new courses at a level suitable for Bioinformatics M.S. students, which will be added as elective course options.

Internal reallocations

This new concentration will have a relatively small number of students compared to our existing M.S. degree. So we expect that our existing administrative resources can handle the new students. The Bioinformatics students will overlap with our existing students on the higher end of technology expertise, while being able to take advantage of our existing courses and faculty. Indeed, one of the attractions of this concentration to our School is the opportunity to attract larger numbers of technically capable students.

Effect on course enrollments in other departments

The proposed concentration is expected to have only minor impact on enrollments outside GSLIS. Many of our technically-oriented M.S. students already take the recommended Computer Science courses and our broad range of supported applications will distribute the number of students taking any one course in any one department.

Impact on library, computer use, laboratory use, etc.

The anticipated increase of technology courses requiring heavy computer usage may strain our existing computer classroom resources. However, we anticipate being able to use such resources elsewhere, such as those planned at the Institute for Genomic Biology, facilitated by existing GSLIS-IGB arrangements. The Library and Information Science Library and other departmental libraries are already actively collecting resources in this field, so no major impact on library resources is anticipated.


Submitted, April 2005:

Linda Smith (GSLIS Associate Dean for Academic Programs, lcsmith@uiuc.edu)

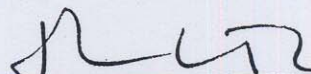
Bruce Schatz (GSLIS Bioinformatics Coordinator, schatz@uiuc.edu)

Statement for the catalog: Provide a brief statement for the program catalog.

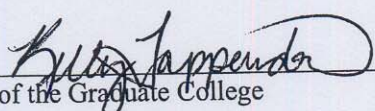
CLEARANCES:

 12/4/06

Head/chair of the sponsoring department or unit Date

 12/4/06

Dean of the college of the sponsoring department or unit Date

 12/15/06

Dean of the Graduate College Date

Chair, Senate Educational Policy Committee Date