BIOMEDICAL INFORMATICS, MS

School of Interdisciplinary Informatics, College of Information Science & Technology

Vision Statement

The vision of this program is to develop the next generation of biomedical specialists who are uniquely positioned to advance research and practice in contemporary information and knowledge management that impact biomedical, clinical and translational research, healthcare services, healthcare practice, public health care, and healthcare delivery in general. Graduates will be able to use their preparation to apply and investigate information and communication technologies to solve problems in the related biomedical fields in a comprehensive, competitive and effective way.

The program is designed as a research-oriented program with the goals of preparing graduate students to conduct advanced basic and applied research while capably serving as prospective employees in academic research as well as the IT healthcare industry. The program is geared towards motivated traditional students and technology specialists with the appropriate educational background that are ready to expand their knowledge of contemporary biomedical informatics issues and become biomedical informatics in academic, clinical, and organizational settings.

Program Contact Information

Dario Ghersi, PhD, Graduate Program Chair (GPC)
173B Peter Kiewit Institute (PKI)
402.554.2097
dghersi@unomaha.edu

Emily Wiemers, Graduate Advisor
170 Peter Kiewit Institute (PKI)
402.554.3819
ewiemers@unomaha.edu

Program Website (https://www.unomaha.edu/college-of-information-science-and-technology/academics/degrees-programs.php)

Other Program Related Information

Fast Track

The School of Interdisciplinary Informatics (SI2) has developed a Fast Track program for highly qualified and motivated students providing the opportunity to complete a bachelor's degree and a master's degree in an accelerated time frame.# With Fast Track, students maycount up to 9 graduate hours toward the completion of their undergraduate program as well as the graduate degree program. Students will work with both undergraduate and graduate advisors to ensure graduate classes selected will count toward both programs, should a student wish to earn a graduate degree in a separate College of Information Science & Technology (CIST) area than their undergraduate degree.

Program Specifics:

- This program is available for undergraduate students pursuing any CIST undergraduate degree desiring to pursue an MS in either the same or a related CIST field.

- Students must have completed no less than 60 undergraduate hours.

- Students must have a minimum undergraduate GPA of 3.0.

- Students must complete the Fast Track Approval form and obtain all signatures and submit to the Office of Graduate Studies prior to first enrollment in a graduate course.

- Students will work with their undergraduate advisor to register for the graduate courses.

- A minimum cumulative GPA of 3.0 is required for graduate coursework to remain in good standing.

- Students remain undergraduates until they meet all the requirements for the undergraduate degree and are eligible for all rights and privileges granted undergraduate status including financial aid.

- Near the end of the undergraduate program, formal application to the graduate program is required. All applicants will need to meet any other admission requirements established for the MS in selected CIST program. The application fee will be waived if the applicant contacts the Office of Graduate Studies for a fee waiver code prior to submitting the MS application.

- Admission to Fast Track does NOT guarantee admission to the graduate program.

- The admit term must be after the completion term of the undergraduate degree.

Admissions

General Application Requirements and Admission Criteria (http://catalog.unomaha.edu/graduate/admission/)

Program-Specific Requirements

Application Deadlines (Spring 2024, Summer 2024, and Fall 2024)

- Fall: July 1
- Spring: December 1
- Summer: April 1

Other Requirements

- The minimum undergraduate grade point average (GPA) requirement for the MS in BMI program is 3.0 or equivalent score on a 4.0 scale. Applicants should have the equivalent of a 4-year undergraduate degree.
- **English Language Proficiency**: Applicants are required to have a command of oral and written English. Those who do not hold a baccalaureate or other advanced degree from the United States **OR** a baccalaureate or other advanced degree from a predetermined country on the waiver list (https://www.unomaha.edu/graduate-studies/prospective-students/Proof%20of%20English%20Proficiency-%20International.pdf), must meet the minimum language proficiency score requirement in order to be considered for admission.
  - Internet-based TOEFL: 80, IELTS: 6.5, PTE: 53, Duolingo: 110
- **Statement of Purpose:** a two-page, double-spaced, word-processed essay that addresses the following two topics:
  - Discussion of two accomplishments that demonstrate your potential for success in the graduate program
  - Discussion of your unique personal qualities and life experiences that distinguish you from other applicants to this graduate program
- **Resume:** Submit a detailed resume indicating your work experience and background.

- **Letters of Recommendation:** Two letters of recommendation from references who can evaluate your work and/or academic achievements are required
- Interview (optional): Although not required, applicants are strongly encouraged to arrange for an interview either one or more members of the Graduate Program Committee by directly contacting the committee chair. Telephone interviews are highly recommended for applicants outside the local area.

Degree Requirements
Science Foundation Requirements

Foundation courses ensure that all students in the Biomedical Informatics (BMI) MS program have a strong foundation on which to build the rest of the program. These courses not only provide essential prerequisite knowledge and skills for subsequent classes in the program, but they also contain a distinct body of knowledge that is an important part of the BMI professional's education. All foundation courses are required for all students. However, applicants who have obtained an undergraduate BMI degree will typically already have this foundation. In such cases, most, if not all, foundation courses are waived. Applicants with undergraduate degrees in other disciplines, including computer science, management information systems, or engineering, will usually require one or more foundation courses. Occasionally, an applicant's work experience may be sufficient to waive one or more of the foundation courses.

Waivers for foundation courses are granted by the chair of the graduate program committee upon the recommendation of the faculty member who is responsible for an individual course. Students requesting a waiver for a particular course should be prepared to meet with a faculty member and answer questions in the area of the course. They should bring to the meeting any relevant transcripts, course syllabi, course material, or evidence of practical experience. Some foundation courses may have an option for testing out.

Applicants should have background in anatomy, physiology, cell biology or equivalent (any health science degree). Applicants with degrees in other disciplines will usually have to take foundation courses.

Foundation courses cannot be used to satisfy the 36 semester hours required for the MS in biomedical informatics degree. Applicants who have not completed all the foundation course requirements may be admitted on a provisional status until those requirements have been completed. All foundation courses must be completed prior to or concurrent with the first six hours of MS in BMI graduate coursework.

Code	Title	Credits
BIOL 2140	GENETICS	4
BIOL 2740	HUMAN ANATOMY AND PHYSIOLOGY I	4
BIOL 2840	HUMAN ANATOMY AND PHYSIOLOGY II	4
BIOL 3020	MOLECULAR BIOLOGY OF THE CELL	3
CIST 2500	INTRODUCTION TO APPLIED STATISTICS FOR IS&T	3

Information Technology Foundation Requirements

Foundation courses ensure that all students in the MS BMI program have a strong foundation on which to build the rest of the program. These courses not only provide essential prerequisite knowledge and skills for subsequent classes in the program, but they also contain a distinct body of knowledge that is an important part of the BMI professional's education. All foundation courses are required for all students. However, applicants who have obtained an undergraduate BMI degree will typically already have this foundation. In such a case, most, if not all, foundation courses are waived. Applicants with undergraduate degrees in other disciplines, including computer science, management information systems, or engineering,

will usually require one or more foundation courses. Occasionally, an applicant's work experience may be sufficient to waive one or more of the foundation courses.

Waivers for foundation courses are granted by the chair of the graduate program committee upon the recommendation of the faculty member who is responsible for an individual course. Students requesting a waiver for a particular course should be prepared to meet with a faculty member and answer questions in the area of the course. They should bring to the meeting any relevant transcripts, course syllabi, course material, or evidence of practical experience. Some foundation courses may have an option for testing out.

Applicants should have background in programming languages, data structures & algorithms, statistics, math or experimental methods (any engineering, computer science related degree). Applicants with degrees in other disciplines will usually have to take foundation courses.

Foundation courses cannot be used to satisfy the 36 semester hours required for the MS in biomedical informatics degree. Applicants who have not completed all the foundation course requirements may be admitted on a provisional status until those requirements have been completed. All foundation courses must be completed prior to or concurrent with the first six hours of MS in BMI graduate coursework

Code	Title	Credits
CSCI 1200	COMPUTER SCIENCE PRINCIPLES	3
CSCI 1204	COMPUTER SCIENCE PRINCIPLES LABORATORY	1
CIST 1400	INTRODUCTION TO COMPUTER SCIENCE I	3
CIST 2500	INTRODUCTION TO APPLIED STATISTICS FOR IS&T	3
CSCI 1620	INTRODUCTION TO COMPUTER SCIENCE II	3
CSCI 3320	DATA STRUCTURES	3
CSCI 8010	FOUNDATIONS OF COMPUTER SCIENCE	3

Requirements

Code	Title	Credits
Required Each Semester		
BMI 8000	ADVANCES IN BIOMEDICAL INFORMATICS	
Core Courses		12
BMI 8100	INTRODUCTION TO BIOMEDICAL INFORMATICS	
BMI 8300	PUBLIC HEALTH GENOMICS	
ISQA 8060	RESEARCH IN MIS	
ISQA 8156	ADVANCED STATISTICAL METHODS FOR IS&T	
Elective Core Courses		6
Select two of the following:		
BMI 8400	LINEAR ALGEBRA FOR ADVANCED COMPUTING AND AI	
BMI 8866	BIOINFORMATICS ALGORITHMS	
CSCI/MATH 8050	ALGORITHMIC GRAPH THEORY	
CSCI/MATH 8156	GRAPH THEORY & APPLICATIONS	
CSCI 8456	INTRODUCTION TO ARTIFICIAL INTELLIGENCE	
ISQA 8106	INFORMATION SYSTEMS ARCHITECTURE AND ORGANIZATION	
ISQA 8220	ADVANCED SYSTEMS ANALYSIS AND DESIGN	

ISQA 8410	DATA MANAGEMENT	
Research Electives		**6**
Select two of the following:		
BIOI 8850	SPECIAL TOPICS IN BIOINFORMATICS	
BMI 8020	ADVANCED COURSE IN BIOINFORMATICS	
ISQA 8080	SEMINAR IN MANAGEMENT INFORMATION SYSTEMS	
ISQA 8160	APPLIED DISTRIBUTION FREE STATISTICS	
ISQA 8340	APPLIED REGRESSION ANALYSIS	
ISQA 9120	APPLIED EXPERIMENTAL DESIGN AND ANALYSIS	
Track Electives		**6-9**
Select one of the following (see details below):		
Bioinformatics Track		
Health Informatics Track		
Exit Requirement		**3-6**
Coursework Option		**3**
BMI 8950	BIOMEDICAL INFORMATICS GRADUATE CAPSTONE	
Thesis Option		**6**
BMI 8990	THESIS IN BIOMEDICAL INFORMATICS	
Total Credits		**36**

Bioinformatics Track Electives

Code	Title	Credits
Select 6-9 hours from the following (depending on which exit requirement is selected):		
BIOL 8136	MOLECULAR GENETICS	
BMI 8080	SEMINAR IN BIOMEDICAL INFORMATICS	
BMI 8850	BIOMEDICINE FOR THE NONMEDICAL PROFESSIONAL	
BMI 8896	COMPUTERIZED GENETIC SEQUENCE ANALYSIS	
BMI 8900	INDEPENDENT RESEARCH IN BIOMEDICAL INFORMATICS	
BMI 8970	INDEPENDENT STUDY IN BIOINFORMATICS	
CSCI 8340	DATABASE MANAGEMENT SYSTEMS II	
CSCI 8876	DATABASE SEARCH AND PATTERN DISCOVERY IN BIOINFORMATICS	
ISQA 8460	INTERNET OF THINGS (IOT), BIG DATA AND THE CLOUD	
ISQA 8750	STORYTELLING WITH DATA	

Health Informatics Track Electives

Code	Title	Credits
Select 6-9 hours from the following (depending on which exit requirement is selected):		
BMI 8080	SEMINAR IN BIOMEDICAL INFORMATICS	
BMI 8900	INDEPENDENT RESEARCH IN BIOMEDICAL INFORMATICS	
BMI 8970	INDEPENDENT STUDY IN BIOINFORMATICS	
ISQA 8196	PROCESS REENGINEERING WITH INFORMATION TECHNOLOGY	
ISQA 8736	DECISION SUPPORT SYSTEMS	

ISQA 8810	INFORMATION TECHNOLOGY PROJECT FUNDAMENTALS	
PA 8740	HEALTH CARE POLICY	

Exit Requirements

- Thesis Option: BMI 8990 6 Hours
  - All candidates should carefully review the Graduate College requirements for forming a Supervisory Committee, Thesis/Thesis Equivalent Proposal Approval forms and final approval and submission of a thesis. This committee will be responsible for planning and supervising the student's thesis in coordination with the the BMI GPC. A supervisory committee shall be formally established for each student upon completion of at least nine hours of coursework or one year (which ever comes first) in the MS program. This committee will have responsible for planning and supervising the student's thesis in coordination with the campus-based BMI graduate program committee.
- Capstone Option: BMI 8950 3 Hours
  - Students who select the capstone exit option will have to select another elective in order to fulfill the program's 36 credit hour requirement.