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
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Program Website (http://www.unomaha.edu/college-of-information-science-and-technology/school-of-interdisciplinary-informatics/biomedical-informatics/ms-bmi.php)

Admissions
Application Deadlines
- Fall: July 1
- Spring: December 1
- Summer: April 1

Program-Specific Requirements
1. Submit a detailed resume indicating your work experience and background.
2. Submit a writing sample from work or previous academic experiences. Alternatively, if you do not have a writing sample, please submit a two-page, double-spaced, word-processed essay that addresses the following two topics:
   a. Discussion of two accomplishments that demonstrate your potential for success in the graduate program.
   b. Discussion of your unique personal qualities and life experiences that distinguish you from other applicants to our graduate program.
3. Submit three (3) letters of recommendation from references who are able to give an in-depth evaluation of your strengths and weaknesses with respect to academic work, and who are competent to judge your probability of success in graduate school.
4. The minimum undergraduate grade point average requirement for the MS in BMI program is 3.00 or equivalent score on a 4.00 scale. All applicants must have the equivalent of a four-year undergraduate degree.
5. GRE or GMAT entrance exams are required with the following minimum scores for those without a baccalaureate or equivalent degree from the United States:
   a. Verbal: 146
   b. Quantitative: 154
6. For unconditional admission, students must meet Graduate College admission standards, including a 3.0 GPA or higher in the last two years of undergraduate work. Students not meeting these standards may be considered for provisional admission. The MS degree does not require GRE test scores.
7. 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 U.S., OR a baccalaureate or other advanced degree from a pre-determined country on the waiver list, must meet the minimum language proficiency score requirement in order to be considered for admission. Minimum scores are:
   a. Paper-based TOEFL: 550
   b. Internet-based TOEFL: 80
   c. IELTS: 6.5
   d. PTE: 53
8. 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.

Admission Criteria
All applicants are considered on an individual basis. All applicants for the MS in BMI program must have earned a bachelor’s degree from a regionally-accredited, four-year institution of higher learning or the equivalent foreign institution and earned a GPA of 3.00 (on a 4.00 scale). Since many factors influence the success of a graduate student, an applicant’s maturity, motivation, employment history, writing samples, work experience and other accomplishments will also be considered in making admission decisions. In addition, for international applicants, TOEFL, IELTS, and PTE scores will be used along with other factors outlined above to make an admission recommendation.

Degree Requirements

Science 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, students who have obtained an undergraduate BIOI degree will typically already have this foundation. In such cases, most, if not all, foundation courses are waived. Students with undergraduate degrees in other disciplines, including computer science, management information systems, or engineering, will usually require one or more foundation courses. Occasionally, a student’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). Students 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. Students 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 (6) hours of MS in BMI graduate coursework.

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, students who have obtained an undergraduate BIOI degree will typically already have this foundation. In such a case, most, if not all, foundation courses are waived. Students with undergraduate degrees in other disciplines, including computer science, management information systems, or engineering, will usually require one or more foundation courses. Occasionally, a student’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). Students 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. Students 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 (6) hours of MS in BMI graduate coursework.

### Requirements

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<tr>
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<th>Credits</th>
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<tr>
<td>BIOL 2140</td>
<td>GENETICS</td>
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<tr>
<td>BIOL 2740</td>
<td>HUMAN PHYSIOLOGY AND ANATOMY I</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 2840</td>
<td>HUMAN PHYSIOLOGY AND ANATOMY II</td>
<td>4</td>
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<tr>
<td>BIOL 3020</td>
<td>MOLECULAR BIOLOGY OF THE CELL</td>
<td>3</td>
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<tr>
<td>CIST 2500</td>
<td>INTRODUCTION TO APPLIED STATISTICS FOR IS&amp;T</td>
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### Elective Core Courses

Select two of the following:

- BIOM 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

### Core Courses

- BIOM 8100 INTRODUCTION TO BIOMEDICAL INFORMATICS
- BIOM 8300 PUBLIC HEALTH GENOMICS
- ISQA 8060 RESEARCH IN MIS
- ISQA 8156 ADVANCED STATISTICAL METHODS FOR IS&T

### Elective Core Courses

Select two of the following:

- BIOM 8850 SPECIAL TOPICS IN BIOINFORMATICS
- BIOM 8020 ADVANCED COURSE IN BIOINFORMATICS
- ISQA 8160 APPLIED DISTRIBUTION FREE STATISTICS
- ISQA 8340 APPLIED REgression ANALYSIS
- ISQA 9120 APPLIED EXPERIMENTAL DESIGN AND ANALYSIS

### Track Electives

Select one of the following (see details below):

- Bioinformatics Track
- Health Informatics Track
- BMI 8990 THESIS IN BIOMEDICAL INFORMATICS

### Total Credits

36

### Bioinformatics Track Electives

Select 6 hours from the following:

- BIOM 8136 MOLECULAR GENETICS
- BIOM 8080 SEMINAR IN BIOMEDICAL INFORMATICS
- BMI 8850 BIOMEDICINE FOR THE NONMEDICAL PROFESSIONAL
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<td>BMI 8896</td>
<td>GENETIC SEQUENCE ANALYSIS</td>
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<td>BMI 8900</td>
<td>INDEPENDENT RESEARCH IN BIOMEDICAL INFORMATICS</td>
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<td>BMI 8970</td>
<td>INDEPENDENT STUDY IN BIOINFORMATICS</td>
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<tr>
<td>CSCI 8340</td>
<td>DATABASE MANAGEMENT SYSTEMS II</td>
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<tr>
<td>CSCI 8876</td>
<td>DATABASE SEARCH AND PATTERN DISCOVERY IN BIOINFORMATICS</td>
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<tr>
<td>ISQA 8460</td>
<td>INTERNET OF THINGS (IOT), BIG DATA AND THE CLOUD</td>
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<tr>
<td>ISQA 8750</td>
<td>INTERACTIVE DATA VISUALIZATION</td>
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Total Credits 6

**Health Informatics Track Electives**

Select 6 hours from the following:

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<tr>
<td>BMI 8080</td>
<td>SEMINAR IN BIOMEDICAL INFORMATICS</td>
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<tr>
<td>BMI 8086</td>
<td>SPECIAL TOPICS: HEALTH INFORMATICS RESEARCH METHODS</td>
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<tr>
<td>BMI 8900</td>
<td>INDEPENDENT RESEARCH IN BIOMEDICAL INFORMATICS</td>
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<td>BMI 8970</td>
<td>INDEPENDENT STUDY IN BIOINFORMATICS</td>
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<tr>
<td>ISQA 8196</td>
<td>PROCESS REENGINEERING WITH INFORMATION TECHNOLOGY</td>
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<td>ISQA 8736</td>
<td>DECISION SUPPORT SYSTEMS</td>
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<tr>
<td>ISQA 8810</td>
<td>INFORMATION TECHNOLOGY PROJECT FUNDAMENTALS</td>
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<tr>
<td>PA 8740</td>
<td>HEALTH CARE POLICY</td>
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Total Credits 6

**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 BMI GPC. A supervisory committee shall be formally established for each student upon completion of at least nine (9) 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.