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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carleebrown@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 College of Information Science & Technology (CIST) 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 may count 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 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, with the exception of Computer Science, which requires a minimum undergraduate GPA of 3.5.
• 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, and the applicant must contact the Office of Graduate Studies for a fee waiver code.
  • Admission to Fast Track does NOT guarantee admission to the graduate program.
  • For all CIST degrees, if a student successfully completes their undergraduate BS degree with a cumulative GPA of 3.0 (3.5 for computer science) and all graduate courses with a 3.0 or better, you may be recommended for 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 2022, Summer 2022, and Fall 2022)
• 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.
• Entrance Exam: International applicants without a baccalaureate or equivalent degree from the United States are required to submit GRE scores. Minimum acceptable scores are: Verbal: 146, Quantitative: 154
• 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.
• Applicants with International Transcripts: Any applicant to this program who has completed undergraduate or graduate coursework at an international higher education institution outside of the United States may submit transcripts and degree certificates (with an English translation) in lieu of a course-by-course transcript evaluation from World Education Services (https://www.wes.org/) (WES), Educational Credential Evaluators (https://www.ece.org/) (ECE), or Educational Perspectives (https://www.edperspective.org/). This graduate program will conduct an in-house credential evaluation of the transcript(s).
  • UNO reserves the right to require a course-by-course evaluation from WES, ECE, or Educational Perspectives if the program is unable to complete an evaluation, or should there be any questions or concerns about the documentation that is received. The applicant
will be notified by the individual program if an external course-by-course evaluation is required.

• “Note: If admitted, official transcripts and degree certificates (with an English translation) official course-by-course transcript evaluation, and any applicable official exam scores are required.

• 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.

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### Requirements

#### Core Courses

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<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CIST 2500</td>
<td>INTRODUCTION TO APPLIED STATISTICS FOR IS&amp;T</td>
<td>3</td>
</tr>
</tbody>
</table>

#### 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.

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<tr>
<td>CSCI 1200</td>
<td>COMPUTER SCIENCE PRINCIPLES</td>
<td>3</td>
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<tr>
<td>CSCI 1204</td>
<td>COMPUTER SCIENCE PRINCIPLES LABORATORY</td>
<td>1</td>
</tr>
<tr>
<td>CIST 1400</td>
<td>INTRODUCTION TO COMPUTER SCIENCE I</td>
<td>3</td>
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<tr>
<td>CIST 2500</td>
<td>INTRODUCTION TO APPLIED STATISTICS FOR IS&amp;T</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 1620</td>
<td>INTRODUCTION TO COMPUTER SCIENCE II</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 3320</td>
<td>DATA STRUCTURES</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 8010</td>
<td>FOUNDATIONS OF COMPUTER SCIENCE</td>
<td>3</td>
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#### Required Each Semester

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<thead>
<tr>
<th>Code</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>BMI 8000</td>
<td>ADVANCES IN BIOMEDICAL INFORMATICS</td>
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#### Requirements

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BMI 8100</td>
<td>INTRODUCTION TO BIOMEDICAL INFORMATICS</td>
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<tr>
<td>BMI 8300</td>
<td>PUBLIC HEALTH GENOMICS</td>
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<tr>
<td>ISQA 8060</td>
<td>RESEARCH IN MIS</td>
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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

Select one of the following (see details below):

- Bioinformatics Track
  - BIOL 8136  MOLECULAR GENETICS
  - BMI 8080  SEMINAR IN BIOINFORMATIONAL INFORMATICS
  - BMI 8850  BIOMEDICINE FOR THE NONMEDICAL PROFESSIONAL
  - BMI 8896  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
  - ISQA 8460  INTERNET OF THINGS (IOT), BIG DATA AND THE CLOUD
  - ISQA 8750  STORYTELLING WITH DATA

Total Credits 36

Health Informatics Track Electives

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<thead>
<tr>
<th>Code</th>
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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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<tr>
<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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<tr>
<td>ISQA 8736</td>
<td>DECISION SUPPORT SYSTEMS</td>
<td></td>
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<tr>
<td>ISQA 8810</td>
<td>INFORMATION TECHNOLOGY PROJECT FUNDAMENTALS</td>
<td></td>
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<tr>
<td>PA 8740</td>
<td>HEALTH CARE POLICY</td>
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</tbody>
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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 hours of coursework or one year (whichever comes first) in the MS program. This committee will have the responsibility for planning and supervising the student's thesis in coordination with the campus-based BMI graduate program committee.