BIOMEDICAL INFORMATICS, PHD

The Doctor of Philosophy in biomedical informatics (BMI) degree is designed to prepare the next generation of biomedical informatics researchers 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. Our graduates will be prepared to proficiently apply and navigate information and computer technologies to drive innovative solutions across various biomedical domains.

The mission of the PhD program is to build following competencies in our graduates:

- Understanding of theory and application of biomedical informatics, integrating computer science, medicine, biology, and healthcare.
- Building proficiency in analyzing, designing, developing, and implementing cutting-edge biomedical informatics systems and technologies.
- Developing capability to conduct and oversee high-quality, basic and applied research in the BMI domain.
- Establishing solid foundation in academic teaching principles.
- Nurturing comprehensive knowledge of multidisciplinary and emerging areas within biomedical informatics.

Program Related Information

Program Contact

Dhundy (Kiran) Bastola, PhD, Doctoral Program Committee Chair
402.554.4899

Emily Wiemers, Graduate Advisor
402.554.3819

bmidpc@unomaha.edu

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

Admissions

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

Application Deadlines

- Spring 2026: December 1
- Summer 2026: April 1
- Fall 2026: July 1

Other Requirements

- **Entrance Exam:** Graduate Record Examination (GRE) scores#are required for most applicants#but#are#only one component of a holistic admission decision.#GRE requirement may be waived for students on an individual basis based on a review by the Doctoral Program Committee.
- **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, must meet the minimum language proficiency score requirement in order to be considered for admission. Minimum acceptable scores are:
  - Internet-based TOEFL: 90, IELTS: 7.0, PTE: 64, Duolingo: 120
- **Statement of Purpose** (not to exceed two pages) which address the following questions:
  - What do you hope to accomplish with a PhD in biomedical informatics?
  - Why are you applying to this specific program?
  - What background or qualifications do you have that you believe are essential for success in this program?
  - What general area or topics do you hope to study?
  - What do you expect to be doing five to ten years after completing the doctoral program?
- **Writing Sample**: Evidence of graduate potential in the form of academic papers, publications, theses or project reports done in an academic or industrial setting.
- **Resume:** Submit a detailed resume indicating your work experience and background.
- **Letters of recommendation:** Three letters from references who can provide a thorough evaluation of your strengths and weaknesses regarding your academic work, and who are qualified to assess your likelihood of success in graduate school.

Applicants must follow the formal procedures established for admission to the graduate program at the appropriate NU campus. Applicants must have:

- successfully completed a baccalaureate degree from an accredited institution: preference will be given to students with a master's or doctoral degree from a related field.
- demonstrate superior performance in mathematics, including calculus, discrete mathematics and statistics, and a sequence of courses in the theory and practice of one or more information technology areas.
- documented test aptitude, interest and commitment to scholarly activities and research.
- proficiency in English, sufficient to engage in advanced studies.

Evaluation for admission will be based on a portfolio approach that will include the following:

- class standing during the applicant's baccalaureate and master's level studies.
- grade point average in the undergraduate degree that is equivalent to 3.5 or higher.
- verbal, quantitative, and analytic scores on the aptitude tests of the Graduate Record Examination (GRE)
- letters of recommendation
- other evidence of graduate potential, such as a portfolio of quality of papers or publications, projects, etc., completed by the applicant either in an academic or industrial setting.
- A personal interview, if warranted and feasible.

International students may be assessed for English proficiency and asked to take courses in English as a second language. All students will be encouraged to take courses to improve their technical writing and professional communication skills.

Degree Requirements

The doctoral BMI program typically requires 90 credit hours beyond a baccalaureate degree. It consists of common required foundation/core courses, including doctoral seminars and colloquia, a major field of study, and a cognate/minor field of study in a related discipline.

The doctoral program is divided into four phases from a student's perspective: foundation/core coursework, major field of study/research

coursework, additional elective coursework in cognate field/minor field of study (as advised by the student's supervisory committee), and doctoral research and dissertation.

Information Technology Prerequisites

Applicants should have a background in programming languages, data structures, statistics, math or experimental methods (any engineering, computer science related degree). Students with degrees in other disciplines will usually have to take foundation courses. Occasionally, a student's work experience may be sufficient to waive one or more foundation courses.

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

Science Prerequisites

Applicants should have a 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. Occasionally, a student's work experience may be sufficient to waive one or more foundation courses.

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

Requirements

Code	Title	Credits
Foundation Courses		**24**
A maximum of 24 credit hours of graduate coursework can be transferred from courses taken in a graduate program prior to admission into the PhD program. These must be approved by the doctoral program committee and included on the plan of study. BMI 8100, Introduction to Biomedical Informatics or equivalent must be included in the 24 hours.		
Required Each Semester		
BMI 8000	ADVANCES IN BIOMEDICAL INFORMATICS	
Research Requirement		**12**
ISQA 9010	FOUNDATIONS OF INFORMATION SYSTEMS RESEARCH	
Select 9 hours from the list below.		
BMI 8020	ADVANCED COURSE IN BIOINFORMATICS	
BMI 8070	HEALTH INFORMATICS RESEARCH METHODS	
CIST 9080	RESEARCH DIRECTIONS IN I.T.	
ISQA 8156	ADVANCED STATISTICAL METHODS FOR IS&T	
Any doctoral level qualitative research method course approved by the Doctoral Program Committee		
Major Field of Study		**18**
Select one of the following:		
Bioinformatics Track		
Health Informatics Track		
Cognate Field		**9**
Graduate courses (8000 or higher) in the areas of biology, ISQA, information assurance, neuroscience, public health, computer science, and pathology are determined with faculty advisement.		
Colloquia		**3**
CIST 9040	COLLOQUIUM ON IT RESEARCH	
CIST 9050	COLLOQUIUM ON IT TEACHING	
CIST 9060	COLLOQUIUM ON IT PROFESSION AND ETHICS	
Exit Requirement		**24**
BMI 9990	DISSERTATION	
Total Credits		**90**

Track Options

(18 hours from either bioinformatics or health informatics)

At least 3 courses (9 credits) must be 9000-level BMI courses. The remaining courses can include at least one 8000-level graduate-only course and up to six hours of 8xx6 courses.

Bioinformatics Track

Code	Title	Credits
Select 18 hours from the following:		18
BMI 8080	SEMINAR IN BIOMEDICAL INFORMATICS	
BMI 8300	PUBLIC HEALTH GENOMICS	
BMI 8400	LINEAR ALGEBRA FOR ADVANCED COMPUTING AND AI	
BMI 8850	BIOMEDICINE FOR THE NONMEDICAL PROFESSIONAL	
BMI 8860	SPECIAL TOPICS IN BIOMEDICAL INFORMATICS	
BMI 8866	BIOINFORMATICS ALGORITHMS	
BMI 8896	COMPUTERIZED GENETIC SEQUENCE ANALYSIS	
BMI 9900	ADVANCED RESEARCH IN BIOMEDICAL INFORMATICS	
BMI 9980	INDEPENDENT RESEARCH IN BIOMEDICAL INFORMATICS	
CSCI/MATH 8156	GRAPH THEORY & APPLICATIONS	
CSCI 8456	PRINCIPLES OF ARTIFICIAL INTELLIGENCE	
CSCI 8876	DATA MANAGEMENT AND KNOWLEDGE DISCOVERY IN COMPUTING AND INFORMATICS	
CIST 9900	SPECIAL TOPICS IN INFORMATION TECHNOLOGY	
ISQA 8410	DATA MANAGEMENT	
ISQA 8460	INTERNET OF THINGS (IOT), BIG DATA AND THE CLOUD	
ISQA 8700	DATA MINING: THEORY AND PRACTICE	
ISQA 8750	STORYTELLING WITH DATA	
ISQA 9020	TECHNICAL AND PROCESS ISSUES IN INFORMATION SYSTEMS RESEARCH	

ISQA 9030	BEHAVIORAL AND ORGANIZATIONAL ISSUES IN INFORMATION SYSTEMS	
ISQA 9120	APPLIED EXPERIMENTAL DESIGN AND ANALYSIS	
ISQA 9130	APPLIED MULTIVARIATE ANALYSIS	
Total Credits		**18**

Health Informatics Track

Code	Title	Credits
Select 18 hours from the following:		18
BMI 8080	SEMINAR IN BIOMEDICAL INFORMATICS	
BMI 8086	SPECIAL TOPICS: HEALTH INFORMATICS RESEARCH METHODS	
BMI 8300	PUBLIC HEALTH GENOMICS	
BMI 8400	LINEAR ALGEBRA FOR ADVANCED COMPUTING AND AI	
BMI 8850	BIOMEDICINE FOR THE NONMEDICAL PROFESSIONAL	
BMI 9980	INDEPENDENT RESEARCH IN BIOMEDICAL INFORMATICS	
CIST 9900	SPECIAL TOPICS IN INFORMATION TECHNOLOGY	
ISQA 8060	RESEARCH IN MIS	
ISQA 8106	INFORMATION SYSTEMS ARCHITECTURE AND ORGANIZATION	
ISQA 8196	PROCESS REENGINEERING WITH INFORMATION TECHNOLOGY	
ISQA 8220	ADVANCED SYSTEMS ANALYSIS AND DESIGN	
ISQA 8410	DATA MANAGEMENT	
ISQA 8460	INTERNET OF THINGS (IOT), BIG DATA AND THE CLOUD	
ISQA 8700	DATA MINING: THEORY AND PRACTICE	
ISQA 8736	DECISION SUPPORT SYSTEMS	
ISQA 8750	STORYTELLING WITH DATA	
ISQA 8810	INFORMATION TECHNOLOGY PROJECT FUNDAMENTALS	
ISQA 9020	TECHNICAL AND PROCESS ISSUES IN INFORMATION SYSTEMS RESEARCH	
ISQA 9030	BEHAVIORAL AND ORGANIZATIONAL ISSUES IN INFORMATION SYSTEMS	
ISQA 9120	APPLIED EXPERIMENTAL DESIGN AND ANALYSIS	
ISQA 9130	APPLIED MULTIVARIATE ANALYSIS	
Total Credits		**18**

Doctoral Program Supervisory Committee

The supervisory committee shall be established before a doctoral student begins the last 45 credit hours of their program of study. This committee will have responsibility for planning and supervision of the student's doctoral program in coordination with the BMI graduate program committee. This includes developing comprehensive exam, defending the the doctoral dissertation proposal, approving the completed dissertation, and conducting the final oral examination. Students should review the BMI Doctoral Handbook for more information on requirements for selecting the supervisory committee members.

The student's dissertation advisor in consultation with the student will nominate the individuals to serve on the supervisory committee. The responsibilities, procedures, and actions of the supervisory committee are governed by the rules and bylaws of the Graduate College as outlined in the UNO Graduate catalog.

Within three weeks of its appointment, the supervisory committee will meet to designate and subsequently submit to the Office of Graduate Studies a complete program of studies conforming to the requirements for the degree. At least half of the total hours for the degree must be completed at the University of Nebraska after the filing of the program of study is filed. Any subsequent changes in the program or in the dissertation topic must be approved by the supervisory committee and recommended to the dean for Graduate Studies.

Academic Requirements

Up to 36 credit hours of the coursework in the preparatory and advanced studies of the doctoral program may be accepted if from an accredited institution. Academic requirements for the doctorate degree include:

- Doctoral research seminars in one or more of the thematic areas of the program.
- Advanced courses (subject to dissertation advisor and graduate committee approvals) related to the student's expected field of study/research area.
- Courses in an associated field of study.
- Courses or colloquia relating to teaching, ethics and research.
- Participation in relevant graduate research seminars each semester.
- Successful passing of qualifying (comprehensive) examination.
- Presentation and defense of a dissertation research proposal on a topic in the approved major field of study/research area.
- Submission of the final dissertation manuscript in appropriate format after a successful dissertation defense.

Requirements for Admission to Candidacy

Students will follow the general candidacy requirements in the UNO Graduate College. Admission to the graduate program does not necessarily imply admission to candidacy for a higher degree.

To be admitted to candidacy for the doctorate degree, a doctoral student must:

- Pass the written qualifying (comprehensive) examination.
- Successfully complete all coursework with satisfactory grades.
- Receive the approval of his/her dissertation proposal before the supervisory committee (oral examination).

After the student has met these requirements, the supervisory committee will recommend to the Office of Graduate Studies his/her admission to candidacy for the doctorate degree, the recommendation will note the dates of completing the comprehensive exam. Such a recommendation must be filed at least seven months prior to the final oral examination for defending his/her dissertation in the presence of his/her supervisory committee. Following admission to candidacy, the student must register during each academic year semester until he/she receives the doctorate degree. Students not in residence may register for a minimum of one semester hour credit in dissertation. Failure to register during each academic year semester will result in termination of candidacy. The term of candidacy is limited to three years.

Dissertation and Final Examination

The dissertation should treat a subject in-depth from the candidate's major field of study/research area and as approved by his/her supervisory committee. The student's dissertation should show his/her technical mastery of the field and create novel material by advancing or modifying knowledge, creating new material, finding new results, drawing new conclusions, or interpreting old material in a new light.

If the dissertation proposal is approved, the student may conduct the dissertation research under the guidance of the dissertation advisor. The student is advised to consult with his/her supervisory committee until the committee accepts the dissertation. After the dissertation research is completed, the dissertation document and/or product must be presented to all the members of the supervisory committee in time to permit review and approval. Manuscripts must be turned in at least thirty days in advance of the final oral examination over the dissertation. The dissertation will be defended at an open meeting conducted by the student's supervisory committee.

Grade Requirements

In addition to maintaining at least a 3.0 GPA for all course work, all doctoral students must obtain a grade of B or better in any of the required courses. Any student failing the grade requirements will be denied from taking the comprehensive examination and/or dismissed from the program.

Exit Requirements

Completing Graduation Requirements

After successfully defending his or her dissertation, the student should obtain signatures from all members of their supervisory committee on the Report on Completion of Degree form and submit the form along with a copy of their title and abstract page to the Office of Graduate Studies.

Teaching Requirements

All doctoral students are required to teach at least one course while studying in the program.

Residency Requirements

All full-time doctoral students must complete 27 hours within 18 months in order to meet the residency requirement of the University. Part-time students must complete 18 hours during the same period. The residency requirement ensures that progress toward the degree occurs within a reasonably compact time frame, enabling the doctoral student to integrate his or her course work with the dissertation.

Progress Report

At the end of each semester, every doctoral student (full-time or part-time) must complete the Progress Report form and submit it to the chair of the doctoral program committee.

Satisfactory Progress

A minimum of three years of full-time graduate study is normally required to complete a doctoral program. The maximum time allowed is eight years from the filing of the student’s plan of study in the Office of Graduate Studies. Students not making satisfactory progress will be counseled out of the program.

Leave of Absence

Under extraordinary circumstances, e.g., medical problems, a student may request a leave of absence from the program for a period of no more than one year. The request must be submitted to and approved by the student’s supervisory committee and/or doctoral program committee. The request should include necessary modifications to the plan of study as a result of the leave. The leave of absence stops the clock for the total time required for the program and the time required to meet the residency requirement. If a student withdraws in mid-semester and is approved for a leave of absence, the clock starts at the beginning of the following semester. A student does not have to have met the residency requirement in order to apply for a leave of absence. If a student does not return to the program within the one year approved for the leave of absence, then the student must submit an application to re-apply to the program. Re-admission to the program is not guaranteed at that point. Please refer to the Graduate Catalog for the complete policy on a leave of absence.