

BIOMEDICAL AND HEALTH INFORMATICS

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Biomedical and Health Informatics is a discipline in the Interdisciplinary Ph.D. (<http://catalog.umkc.edu/colleges-schools/graduate-studies/interdisciplinary-phd-program/>) Program administered by the School of Graduate Studies.

Note: The discipline-specific requirements listed here are *in addition* to the requirements listed in Interdisciplinary Ph.D. Application Procedure and Minimum Criteria for Admission and Minimum Interdisciplinary Ph.D. Academic Regulations and Degree Requirements. Information on applying to the Biomedical and Health Informatics discipline can be found at the School of Medicine website for the primary discipline and co-discipline.

Discipline Overview

Biomedical and Health Informatics is the “scientific field that deals with biomedical information, data, and knowledge – their storage, retrieval, and optimal use for problem solving and decision making. It accordingly touches on all basic and applied fields in biomedical science and is closely tied to modern information technologies, notably in the areas of computing and communication, i.e. medical computer science.” (Definition from Stanford University, Medical Informatics.) The National Center for Biotechnology Information defines Bioinformatics as the “field of science in which medicine, biology, computer science, and information technology merge to form a single discipline. The ultimate goal of the field is to enable the discovery of new biological insights as well as to create a global perspective from which unifying principles in biology and health can be discerned.”

Curriculum Overview

The goal of the Biomedical and Health Informatics Ph.D. discipline is to train researchers to contribute to the translation of basic science findings into patient care and ultimately into community standards and policy. Given the diversity of specialties that are included in the field of biomedical and health informatics, individual training will vary depending on the student’s career goals. Graduates of this discipline will be able to apply knowledge and skills in the area of biomedical and health informatics by: generating a research hypothesis; proposing, conducting, and reporting research; performing appropriate statistical analysis; and, communicating scientific information.

Admissions

Applicants must meet both the general and the discipline specific criteria for admission and be recommended for admission by the doctoral faculty review groups in at least two disciplines. Upon approval by the graduate dean, students are admitted to the School of Graduate Studies.

General Admissions Requirements

Please visit the Interdisciplinary Ph.D. Program Admissions Page (<http://sgs.umkc.edu/iphd-landing-page/>) to learn about the general application requirements.

Discipline Specific Admissions Requirements

Please visit the School of Medicine website for information on applying to the Biomedical and Health Informatics primary discipline and co-discipline to learn about the discipline specific application requirements. Your application to the Biomedical and Health Informatics discipline is NOT considered complete until you submit a one-page goal statement. This statement should elucidate your interest in the discipline and elucidate how your choice of secondary discipline will bolster your research agenda. This should be submitted through the School of Medicine Supplemental Application

Suggested Compatible Disciplines

Cell Biology and Biophysics (<https://catalog.umkc.edu/colleges-schools/graduate-studies/cell-biology-biophysics/>), Computer Science (<https://catalog.umkc.edu/colleges-schools/graduate-studies/computer-science/>), Engineering (<https://catalog.umkc.edu/colleges-schools/graduate-studies/engineering/>), Mathematics (<https://catalog.umkc.edu/colleges-schools/graduate-studies/mathematics/>), Molecular Biology and Biochemistry (<https://catalog.umkc.edu/colleges-schools/graduate-studies/molecular-biology-biochemistry/>), Oral and Craniofacial Sciences (<https://catalog.umkc.edu/colleges-schools/graduate-studies/oral-craniofacial-sciences/>), Pharmaceutical Sciences (<https://catalog.umkc.edu/colleges-schools/graduate-studies/pharmaceutical-sciences/>), Pharmacology (<https://catalog.umkc.edu/colleges-schools/graduate-studies/pharmacology/>), Public Affairs and Administration (<https://catalog.umkc.edu/colleges-schools/graduate-studies/public-affairs-administration/>), Social Science Consortium (<https://catalog.umkc.edu/colleges-schools/graduate-studies/social-science-consortium-economics-political-science-sociology/>)

Core Program Requirements

Biomedical and Health Informatics as a Primary Discipline

In order to complete the Interdisciplinary Ph.D. with Biomedical and Health Informatics as the primary discipline, students complete a minimum of 48 credit hours in post-baccalaureate studies consisting of the following:

- 36 credit hours of didactic course work
 - 21 credit hours of primary discipline course work
 - 9-12 credit hours of co-discipline course work
 - 6 credit hours of elective course work
- 12 credit hours of dissertation research

No more than 60% of didactic course work in the student's overall Plan of Study can be from any one discipline. A minimum of 9 credit hours of graduate coursework in the co-discipline is required by the Interdisciplinary Ph.D. Program. Specific requirements of the student's chosen co-discipline may require additional credit hours beyond the nine listed here.

Core coursework in the Biomedical and Health Informatics Primary discipline will include a minimum of 18 credit hours of courses in the table below. Courses taken to meet this requirement may be adjusted to reflect the courses taken in the chosen co-discipline.

Code	Title	Credits
Biostatistics (select 2 of the following)		6 hours required
MEDB 5501	Applied Biostatistics I	
MEDB 5502	Applied Biostatistics II	
MEDB 5503	Biostatistics III-Mixed-Effects Models	
MEDB 5535	Quantitative Aspects of Epidemiologic Research	
Research Methodology and Research Ethics		6 hours required
MEDB 5510	Clinical Research Methodology	
MEDB 5561	Responsible Conduct of Research	
Informatics (select 2 of the following)		6 hours required
MEDB 5520	Introduction to Medical Informatics	
BIOLOGY 5525	Bioinformatics and Data Analysis	
COMP-SCI 5565	Introduction to Statistical Learning	
COMP-SCI 5590	Special Topics (Machine Learning)	

Elective Coursework

The number of credit hours of elective graduate coursework that a student completes will vary depending on the number of credit hours required by their co-discipline; the total number of graduate coursework credit hours across their primary discipline, co-discipline, and electives must equal a minimum of 36 credit hours. Students may work with their advisors to tailor elective coursework based on their specific areas of interest. For example, students interested in genomics will take different elective courses than students interested in a clinical research emphasis. At least 75% of the total coursework must be from disciplines that are certified as eligible to participate in the Interdisciplinary PhD program.

Discipline Specific Requirements

- **Qualifying Examination:** The qualifying examination must be successfully completed before the student can enroll in dissertation and research hours and focus on their dissertation research.
- **Comprehensive Examination:** The comprehensive examination will consist of both a written component and an oral component that reflects dissertation research.
- **Dissertation Research:** Dissertation research will be conducted while the student is enrolled in Pre-Dissertation and Research (MEDB 5696) and Dissertation and Research (MEDB 5699) credit hours. Twelve credit hours in Dissertation and Research must be completed before the dissertation will be approved. Dissertation research will be reported in both a written format (three publication-ready manuscripts) and an oral format (formal presentation of dissertation research).
- **Written Dissertation:** The final format of the dissertation work to be submitted to the university will follow general dissertation formatting guidelines and will include the three publication-ready manuscripts.
- **Graduate Seminar:** Primary discipline students are required to attend and actively participate in the Multidisciplinary Seminar (MEDB 5540) until successful completion of the Qualifying exam, which will include providing research presentations.

Biomedical and Health Informatics as a Co-discipline

Based on students' experience and the requirements of their primary discipline, they will be required to complete at least 9 credit hours from the co-discipline as specified by the UMKC Interdisciplinary Ph.D. Program. While the following courses are suggested core components for the Biomedical and Health Informatics co-discipline, students will work with the discipline coordinator to create an individualized plan of study for their co-discipline courses.

Code	Title	Credits
MEDB 5501	Applied Biostatistics I	3
MEDB 5502	Applied Biostatistics II	3
MEDB 5510	Clinical Research Methodology	3
Depending on prior coursework, the below may be substituted.		
MEDB 5511	Principles and Applications of Epidemiology	3
MEDB 5514	Human Genome Epidemiology	3
MEDB 5520	Introduction to Medical Informatics	3
MEDB 5535	Quantitative Aspects of Epidemiologic Research	3

Note: All students will be expected to have Biostatistics as a core competency for this co-discipline; however, it is assumed that students with a primary discipline in Mathematics will not need additional course work in statistical analysis.

Prerequisite Coursework

Prerequisite coursework may not count toward the student's required graduate credits.

For the department's policy on academic progression, please contact the discipline coordinator.