

BIOMEDICAL INFORMATICS (PHD)

Program Description and Goals

This program is designed to be a research-based multidisciplinary program involving students with a variety of backgrounds. Students will work together in teams to research real clinical and biomedical health problems. They will gain both the scientific background for research and skills needed to address problems. The program is designed to meet the unique needs of each student by using a matrix curriculum plan with an advising committee to guide each student from admission through graduation. Each student must have a faculty academic advisor to guide each student through participation in research projects.

The PhD program in Biomedical Informatics is conceptualized and designed to be inherently multidisciplinary and integrative. This means that the fundamental informatics concepts that transcend and apply to all traditional healthcare disciplines will be emphasized in the PhD program. This program will identify and teach the major informatics concepts that integrate and link diverse health disciplines.

The PhD program in Biomedical Informatics is constructed as a post-baccalaureate degree that not only addresses the knowledge and skills that the student brings at admission, but allows the student to build on previous knowledge and skills in order to attain the research focus needed for the completion of the PhD program in Biomedical Informatics.

Students admitted to the master's program can apply to the PhD program by meeting the same admission requirements as those who apply directly to the PhD program.

Formal study of informatics at the PhD level at McWilliams School of Biomedical Informatics at UTHealth Houston is designed to accomplish these major goals:

- Expand the scope of the discipline of Biomedical Informatics
- Demonstrate familiarity with the Biomedical Informatics research literature, including in-depth knowledge of a selected Biomedical Informatics research area.
- Research and evaluate new regions or domains in Biomedical Informatics
- Lead interdisciplinary teams in the search for solutions to Biomedical Informatics problems
- Effectively communicate research findings to peers and to practitioners who can use the research findings.

The PhD program is a 93-semester credit hour full-time program developed as a post baccalaureate program. Part-time enrollment requires written approval of the advisor and advising committee.

Doctor of Philosophy in Biomedical Informatics Admission Process

The applicant should present a completed application and official documentation of the following:

1. A baccalaureate degree or higher
2. Official transcripts from all colleges and universities attended
3. A resume or curriculum vitae (as appropriate)

4. Three letters of reference from educators and/or employers.
5. A Graduate Record Exam (GRE) score. GRE waivers may be considered on a case-by-case basis, exemption criteria can be reviewed on the admissions requirement website (<https://sbmi.uth.edu/prospective-students/admission-requirements.htm>). Official GRE test scores must be no more than five (5) years old.
6. Goal Statement – follow template instructions on the school's website (<https://sbmi.uth.edu/prospective-students/admission-requirements.htm>)
7. Students with international college transcripts must submit a course-by-course evaluation report by either World Education Services or Educational Credential Evaluators.
8. For International Applicants: A minimum TOEFL score of 94 is acceptable on the internet-based test. A minimum acceptable score for the IELTS is a 7.
9. Interview with the McWilliams School of Biomedical Informatics Admissions, Progression and Graduation (APG) Committee by invitation only. Applicants will also complete a writing assessment as part of the interview process.

Requirements for International Applicants

- The Test of English as a Foreign Language (<https://www.ets.org/toefl.html>) (TOEFL) or the International English Testing System (<https://ielts.org/ielts-usa/>) (IELTS). For admissions consideration a minimum acceptable score of 94 on the internet-based TOEFL is required or a minimum acceptable overall score of 7.0 on the IELTS is required. Test scores are valid for two years from the test date. The official scores must be submitted directly to GradCAS from the applicable test center. Submit official TOEFL scores by using the reporting code B886; no department code is required. Submit official IELTS scores by sending them to GradCAS; no code is needed. Testing is at the applicant's expense.
- International applicants who have received a diploma from a university at which English is the language of instruction are not required to submit an English Language exam. If this school is outside of an English-speaking country, evidence that indicates the language of instruction will need to be provided with your application such as a letter from the University on official letterhead.
- International applicants must submit official transcripts and a course-by-course education evaluation of all transcripts from all universities attended outside the United States. The application forms for such an evaluation may be obtained online from the service providers; Educational Credential Evaluators, Inc. (ECE) (<https://www.ece.org>) and World Education Services (WES) (<https://www.wes.org>). Only evaluations from ECE or WES will be accepted. The results of the evaluation must be submitted directly to GradCAS by the agency. The evaluation report is at the applicant's expense.
- F-1 sponsorship is available for students in the PhD program.
- The I-20 form, required by the Department of Homeland Security (DHS) and the United States Citizenship and Immigration Services (USCIS), is prepared by UTHealth Houston and issued to qualified non-immigrant applicants who have been admitted and who have demonstrated financial ability to support their education. Upon acceptance, the non-immigrant student will be asked to provide financial and visa information so that the I-20 form may be completed. The student must submit the completed form to the American Embassy in his/her country of origin in order to receive a student visa or must otherwise be eligible for F-1 status in the U.S.

Please contact the UTHealth Houston Office of International Affairs for information (713-500-3176, utoiahouston@uth.tmc.edu).

Doctor of Philosophy in Biomedical Informatics Application Deadlines

- Fall admission: December 1
- Spring admission: July 1

PhD Application Review and Admission Process

Review by the Admissions, Progression, and Graduation (APG) Committee

Applicant materials will be reviewed by the admissions committee. The admissions committee will review the materials and recommend whether applicants will be offered an interview - the next step in the PhD admissions process. Applicants who are recommended for an interview will be contacted by Office of Academic Affairs for scheduling.

Interview

Applicants who proceed to the next level of the admission process will be interviewed by McWilliams School of Biomedical Informatics faculty members. The interview will focus on the applicant's research goals and how they will be achieved in the PhD program. Applicants will also complete a writing assessment as part of the interview process.

Academic Advising

The PhD Coordinator serves as the primary advisor until an Advising Committee and Committee Chair has been identified.

As a student progresses, he or she must identify an academic advisor. This person will serve as the Committee Chair. The Committee Chair (also known as mentor, PI, dissertation director, advisor) is a fulltime member of the School of Biomedical Informatics faculty who works with the student to develop a research topic, helps formulate ideas and guides the progress of the dissertation. In some cases, although rare, there is a Committee Co#Chair (principal research, co#advisor) who also advises the student. The Committee Chair should be identified during the first year or initial semester of the second year. The Change of Advisor Form (available on the Current Students section of the website) for changing the PhD Coordinator to the named advisor must be completed following identification of a Committee Chair.

The student, in consultation with his/her Committee Chair, will identify the other members of the Advising Committee. Committee members are those who have expertise in and inform the student's area of research, serve as a reader of the proposal and dissertation, and vote on the outcome of the qualifying exam, proposal defense and outcome of final dissertation. A minimum of three individuals must serve on the final Advising Committee. At least two members of this committee, including the Chair, must be fulltime members of McWilliams School of Biomedical Informatics faculty.

Students are responsible for scheduling and planning meetings with their committee and meeting milestones defined by this catalog. Student course selection must be approved by the Committee Chair and appropriately documented on the PhD Degree Plan form (available on the McWilliams School of Biomedical Informatics Current Students section of the website). Students are encouraged to meet with their Advising

committee during the course of each semester to discuss ongoing progress and formulate plans for acceptable academic progress.

Transfer Credit

Transfer credit for equivalent graduate courses taken elsewhere may be awarded and used to meet degree requirements if their equivalency to a McWilliams School of Biomedical Informatics degree program course is approved through a Petition for Equivalency Credit (PEC). The maximum number of transferable semester credit hours is 36 for the PhD program. Contact the Office of Academic Affairs for information.

Courses that are being accepted at McWilliams School of Biomedical Informatics, through a dual or joint degree program, can only be transferred in if the grade earned in the course is a "B" or higher. Courses for which grades of less than "B" were earned will not be accepted for transfer. Courses must have been completed within the last five years to qualify. See "Five(5)-Year Rule (<https://catalog.uth.edu/biomedical-informatics/academic-standards-policies-procedures/>)".

Students who are presenting course work from universities or colleges outside the United States to meet admission or graduation requirements are referred to the section on International Applicants in this catalog for a listing of additional requirements.

Financial Assistance

McWilliams School of Biomedical Informatics offers scholarships for PhD students that include full tuition support during the first year of academic study. Competitive full-ride scholarship opportunities are also available. These competitive scholarships are limited and offered to the most qualified PhD program applicants. Graduate Research Assistantships and Student Teaching Assistantships are available on a case-by-case basis. Students must submit an application to be considered for these opportunities.

PhD Academic Requirements

A total of 93 semester credit hours must be completed prior to graduation. Both full#time and part-time students in the PhD Program in Biomedical Informatics have up to eight years from the time of entry to complete the required coursework. Continuous enrollment is required unless approval from the advising committee is obtained. Each student will develop a degree plan with written approval of their academic advisor. A signed degree plan, found here (<https://sbmi.uth.edu/current-students/curriculum/>), will be filed each academic year that includes the required and/or elective courses as specified for the student's PhD program.

A maximum of six credit hours of Directed Study can be applied toward the PhD program.

Other Requirements

In Residence Requirement: The term "in residence" refers to the requirement that a student completes 57 semester credit hours over the course of the program at UTHealth Houston. A student must fulfill his or her in residence requirement in order to receive a PhD degree from the School.

Curriculum for the Doctor of Philosophy in Biomedical Informatics Program

The curriculum of the PhD degree in Biomedical Informatics includes required didactic courses and elective courses. Didactic courses (lecture/discussion, demonstration and student laboratories) are presented to

provide facts, concepts, and theories related to the techniques, and procedures of Biomedical Informatics. They include instruction in basic informatics, research, advanced informatics and support courses. The elective courses are designed to give students the opportunity to apply theory and techniques in the hospital, research, or private laboratory setting.

Required Courses from School Catalog

The PhD Program requires a minimum of 93 semester credit hours of study. The following courses are required for the PhD degree plan.

Code	Title	Hours
BMI 5300	Introduction to Biomedical Informatics ¹	3
BMI 5007	Methods in Health Data Science ¹	3
BMI 5310	Foundations of Biomedical Information Sciences I ¹	3
BMI 5311	Foundations of Biomedical Information Sciences II ¹	3
BMI 5352	Statistical Methods in Biomedical Informatics ¹	3-4
or PHM 1690L	Introduction to Biostatistics in Public Health	
BMI 6319	Data Analysis for Scientific Research in Biomedical Informatics ¹	3
BMI 7302	Theories & Frameworks for BMI ¹	3
BMI 7303	Critical Review of Biomedical Informatics Literature Seminar ¹	3
BMI 7304	Advanced Research Design for Biomedical Informatics ¹	3
Elective Courses (seven courses)		
	Advanced Level Statistics Course ²	3
	Six Additional Courses (totaling 18 hours)	18
Other Requirements		
BMI 7000	Advanced Preceptorship	9
BMI 7050	Research in Biomedical Informatics ³	21
BMI 7150	Research Seminar ⁴	3
or BMI 7151	Seminar in Precision Medicine	
BMI 7301	Grant Writing	3
BMI 9999	Dissertation in Biomedical Informatics	9
Total Hours		93

¹ Course must be completed prior to the qualifying exam. Requirements for these courses can be met through concurrent enrollment at other institutions and/or by consent of the student's Academic Advisor.

² Not offered at McWilliams School of Biomedical Informatics – See Advisor for concurrent enrollment options.

³ BMI 7050 must be repeated for maximum of 21 semester credit hours to meet the PhD degree requirements.

⁴ BMI 7150 OR BMI 7151 must be repeated for a maximum of 3 semester credit hours to meet the PhD degree requirements.

Progression

Each year, students will be reviewed by the faculty to determine if adequate progress in the program has been made. This review is facilitated by the completion of annual Individualized Development Plans (IDP). It is the student's responsibility to maintain and update this plan in cooperation with their advisor. IDPs are filed annually with the Office of Academic Affairs. Failure to make adequate progress will result in action

by the Admission, Progression and Graduation Committee. Action may include, but is not limited to additional review and monitoring of progress, changes in student standing (at risk, on probation, etc.) or dismissal from the program.

Qualifying Exam

The goals of the PhD qualifying exam are:

1. To motivate students to review and synthesize course work and reported research
2. To determine the student's ability to understand and apply fundamental concepts
3. To develop and test the student's ability to communicate orally and to respond to questions and comments
4. To evaluate the student's potential to pursue doctoral research
5. To identify areas needing strengthening for the student to be successful as a PhD student and independent scholar
6. To provide a mechanism for faculty to come to know the student's capabilities

Students should prepare for a comprehensive qualifying exam within the semester following their sixth completed full-time semester or after completion of their 48th semester credit hour. The plan for the qualifying exam will be developed in conjunction with the academic advisor. The qualifying exam consists of demonstration of competency within two areas:

Domain Specific Knowledge

Demonstration knowledge, understanding, and proficiency in domain specific content and methodology. One of the purposes is to challenge students to discover relevant literature and deepen their knowledge of interests within this track.

Breadth of Knowledge across the discipline

Demonstrate breadth of knowledge across health sciences disciplines through questions that require synthesis of knowledge from core areas.

Submission deadlines related to materials related for the qualifying exam (e.g. reading list, abstract/proposal to committee) will follow a set timeline following the student's declaration of intent. All components of the qualifying exam must be attempted within 30 days. The qualifying exam is composed of a total of seven graded sections: three domain specific questions, three general informatics questions and an oral presentation. A student must be ultimately successful on each question/section of the qualifying exam to progress in the PhD Program.

General Structure of the Exam

1. Topics for the exam will include materials covered in the Core Courses (indicated by *) and materials selected within a specific domain. The domain specific reading list will be developed in conjunction with the Committee Chair/Advising Committee.
2. Students will complete a written exam including both domain general and domain specific questions.
3. In addition to the exam, students will prepare a proposal abstract (1-2 pages) and deliver a public presentation of this abstract.
4. Following the written exam and public presentation, the student, Advising Committee, and PhD Qualifying Exam Committee will take part in a closed question and answer session (1-2 hours) over the written exam and public presentation.

The qualifying exam dossier will contain the following items:

- Research project abstract
- Preliminary dissertation proposal (one to two pages, demonstrating knowledge and work of the student and others, synthesized to present a rationale for the proposed dissertation topic (e.g., theory to be developed, hypotheses to be tested) as well as proposed methodology to fulfill the dissertation objective.)
- List of references (30-50 articles) and syllabi for relevant classes for three domain areas related to their proposed research. Students should discuss these areas with their advisor in the process of planning their graduate program and prior to preparation of their qualifying exam materials.
- Current CV
- All previously completed Individualized Development Plans

Grading for the Written Qualifying Exam Component:

- Pass unconditionally (score between 28-35)
- Pass conditionally (21-27)
- Fail with option to retake (16-20)
- Fail without option to retake (Less than 16)

Grading for the Oral Qualifying Exam Component:

- Pass unconditionally (score between 3 and 4)
- Pass conditionally (2.5-2.99)
- Fail with option to retake (2.0-2.49)
- Fail without option to retake (Less than 2)

Remediation Procedures

Should a student score either pass conditionally or fail with the option to retake, the original assigned graders will determine the final score for each question following remediation. Remediation may include addressing the shortcomings of the written questions during the oral presentation section of the exam, rewriting a question response, drafting a paper to address problems with a written question, presenting an improved oral presentation, or remediation through additional coursework. The student's PhD Advising Committee will determine the form of remediation and evaluation for the domain-specific questions. The PhD Qualifying Exam Committee will determine remediation on the general knowledge questions. The two committees will work together to determine the requirements for the student should remediation be needed on the oral presentation. Remediation responses will be graded on a pass/fail basis. Efforts to retake or remediate must be completed within 12 weeks. Failure to successfully pass all components will result in dismissal from the program. Students with scores between 16-20 for four or more graded sections of the written qualifying exam will fail the exam without the opportunity for remediation. A single score below 16 on any section will result in dismissal.

Advanced Preceptorship

Advanced Preceptorship is required for all PhD students. During Advanced Preceptorship, the student will develop and prepare his or her Advance to Candidacy Proposal including: defining the proposed research agenda; a review of the literature; research design, procedure and data analysis; collecting preliminary data; and scientific contribution to the discipline. The student's primary advisor and advising committee must approve the focus of the research. Students must successfully pass their Qualifying Exam prior to registering for Advanced Preceptorship hours.

Advancement to Candidacy

Admission to the PhD program does not constitute or guarantee a student's admission to candidacy for the PhD degree. Within two full-time semesters or completion of 18 semester credit hours after completion of the qualifying exam, each student must submit an advance to candidacy proposal and give an oral presentation of their completed and proposed work to their Advising Committee. Successful advance to candidacy proposal defense includes approval of both the written proposal and its oral presentation. The oral presentation is open to the public and the candidacy proposal is only disseminated to the student's advising committee. Approval of the advance to candidacy proposal is required for continued progress towards the degree and designation as a doctoral candidate.

A student passes their advance to candidacy proposal defense if the majority of their Advising Committee votes to pass and the student's primary advisor votes to pass. In the event of a tie, the Associate Dean for Academic and Curricular Affairs will break the tie. If the Associate Dean for Academic and Curricular Affairs is on the committee, the Committee Chair will break the tie. If the Associate Dean for Academic and Curricular Affairs is the Committee Chair, the Dean will break the tie. If the student passes, he or she is admitted to candidacy. If the student does not pass, the Advising Committee can recommend failure without another attempt or failure with the opportunity to re-defend within 30 days. If the student again does not pass the defense, he or she will be given the option of completing a Master of Science in Biomedical Informatics degree but will otherwise be dismissed from the doctoral program.

Dissertation

The faculty believes that communication and dissemination is a critical aspect of the research process. The student will have two options available for the dissertation. The first option will consist of three articles that are accepted for publication. Publication must be in journals or proceedings, which are both peer-reviewed and indexed for academic retrieval. The three papers are combined with an introduction and summary and bound as a dissertation. The second option requires the student to write a monograph or dissertation. The monograph will review the literature, research approaches and options, the data design and gathering processes. The findings and data will be discussed in the context of the published literature. The monograph will be bound.

The dissertation must be presented at an oral defense that is open to the public. All research papers, theses, and dissertations authored by degree candidates are available to interested members of the general public upon request. After the presentation, the student's Advising Committee votes to award the degree, allow for re-defense of the dissertation within 30 calendar days of the failed attempt, or dismiss the student from the program without a degree.

Petitioning for Extension

Students who have exceeded their time to degree deadline or a milestone deadline for the qualifying exam or prospectus may petition APG for an extension. The Petition to Extend Time Boundary for Qualifying Exam, Advance to Candidacy or Dissertation Defense form can be found under the Current Student section of the school website (<https://sbmi.uth.edu/current-students/>).

For further curriculum information, contact:

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