BIOSYSTEMS ENGINEERING, PH.D.

Biosystems Engineering
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Academic Staff: Please refer to the Biosystems Engineering website (https://umanitoba.ca/engineering/faculty-staff/biosystems-engineering/) for Faculty information.

Biosystems Engineering Program Information

The Department of Biosystems Engineering offers graduate programs leading to Master of Science, Master of Engineering, and Doctor of Philosophy degrees. The graduate programs in the department focus on applications of engineering in biological systems. Strong emphasis is placed on assisting graduate students to gain a broad range of skills and experience in conducting interdisciplinary research, in understanding the interrelationships among physical and biological factors, and in written and oral communication.

Admission Information

Admission to the Faculty of Graduate and Postdoctoral Studies

Application and Admission Procedures are found in the Academic Guide (https://catalog.umanitoba.ca/graduate-studies/academic-guide/application-admission-registration-policies/).

Admission requirements for doctoral students are found in the Doctor of Philosophy General Regulations (https://catalog.umanitoba.ca/graduate-studies/academic-guide/doctor-philosophy-general-regulations/) section of the Guide.

Biosystems Engineering Ph.D. Admission Requirements

For admission into the Ph.D. program, applicants are normally required to hold a M.Sc. degree in Biosystems Engineering or equivalent from a recognized university. Applicants with degrees in related areas may be recommended for admission by the Department Head.

Students making exceptional progress while enrolled in the M.Sc. program may request to transfer to the Ph.D. program upon the consent of the department head and based on a recommendation from the student's advisory committee and the Biosystems Engineering Graduate Studies Committee which investigates the student's qualifications and suitability for Ph.D. study. In such cases, the student will be required to complete a total of 24 credit hours (which includes any courses completed in the Master's program prior to the time of transfer), of which at least 18 must be at the 7000 level.

Application Information

Students should complete and submit their online application with supporting documentation by the date indicated on the Biosystems Engineering Ph.D. program of study (https://umanitoba.ca/explore/programs-of-study/biosystems-engineering-phd/) page.

Degree Requirements

Students are normally required to complete 12 credit hours of coursework, including a seminar course (BIOE 7270), and a thesis. The remaining 9 credit hours at the 7000 level can be taken from any Department.

Graduate Specialization in Engineering Education (GSEE)

The Department of Biosystems Engineering offers a Graduate Specialization in Engineering Education (GSEE) at the Doctoral level. The GSEE will require 12 credit hours of coursework at the 7000 level and a thesis on an Engineering Education topic. The coursework requirements include:

1. BIOE 7270 Advanced Seminar in Biosystems Engineering;
2. One research methodologies course (3 credit hours) at the 7000 level as approved by the student's supervisor; and
3. Two courses at the 7000 level (6 credit hours) approved by the student's supervisor, at least one of which must be an ENG 7000-level course (e.g., ENG 7010 The Engineering Design Process; ENG 7020 Topics in Engineering Education Practice; ENG 7030 The Discipline of Engineering Education; ENG 7040 Foundations of Engineering Education Research.)

Expected time to graduate: 3 - 4 years

Progression Chart

All students must complete a minimum of 12 credit hours of coursework approved by the faculty advisor.

Course	Title	Hours
Year 1		
GRAD 7300	Research Integrity Tutorial	0
GRAD 7500	Academic Integrity Tutorial	0
BIOE 7270	Advanced Seminar in Biosystems Engineering	3
COURSE 7XXX	Courses designated 7000 or above from any department	9
Thesis Proposal		
	Hours	**12**
Years 2-3		
GRAD 8010	Doctoral Candidacy Examination	0
	Hours	**0**
Years 3-4		
GRAD 8000	Doctoral Thesis	0
	Hours	**0**
	Total Hours	**12**

Students are expected to demonstrate independence and professionalism during their graduate studies. Students are expected to be present on campus for scheduled classes, regular meetings with the advisor, and research work (unless the research work is being done at a site off-campus). It is understood that progress on research may be limited when the student is taking classes, however, substantial progress is expected during periods when classes are not being taken. Research progress includes tasks such as reviewing scientific literature, collecting

experimental data, analyzing experimental data, and paper/thesis writing. Ph.D. students are expected to display increasing independence as they proceed through the doctoral program. The advisory committee will judge whether the academic performance has been satisfactory based on the plans outlined in the previous "Progress Report" form.

Thesis Proposal

The thesis proposal will normally be reviewed and approved by the advisory committee within the first 12 months of the PhD program. It will consist of a maximum 20-page (double spaced) proposal including sections on objectives & sub-objectives, brief review of relevant literature, proposed methodology, and impact/significance of the proposed research. The PhD student will give a 20-25 minute presentation on the thesis proposal. The advisory committee may ask questions of clarification or offer suggestions for modification of the research objectives and/or proposed methodology. The thesis proposal presentation should not be viewed as an oral examination that must be passed. The purpose is to set the direction of the students' research with input from the advisory committee.

Doctoral Candidacy Examination

The candidacy examination consists of two parts (i.e., a written portion and an oral portion) that together comprise the candidacy examination.

Doctoral Thesis

The thesis must constitute a distinct contribution to knowledge in the major field of study, and the research must be of sufficient merit to be, in the judgement of the examiners, acceptable for publication. The final examination for the PhD degree, which is organized by the Faculty of Graduate Studies, includes two distinct stages: i) examination of the candidate's written thesis by members of the examining committee followed by ii) an oral examination in which the student presents an overview of the work in 20-30 minutes and is expected to answer questions on the subject of the thesis.

Registration Information

Students should familiarize themselves with the Faculty of Graduate and Postdoctoral Studies 'GRAD' courses applicable to their program (https://catalog.umanitoba.ca/graduate-studies/registration-information/). If you have questions about which GRAD course(s) to register in, please consult your home department/unit.

Courses are subject to cancellation if there is insufficient enrolment. Courses with insufficient enrolment may be cancelled the first week of classes. Not all courses will be offered each year — contact the department for courses that will not be offered. All returning and newly admitted students must see an academic advisor or the department head prior to attempting to register.

Regulations

Students must meet the requirements as outlined in both Supplementary Regulation and BFAR documents as approved by Senate.

Supplementary Regulations

Individual units may require specific requirements above and beyond those of the Faculty of Graduate and Postdoctoral Studies, and students should consult unit supplementary regulations (https://umanitoba.ca/graduate-studies/supplementary-regulations/) for these specific regulations.

Bona Fide Academic Requirements (BFAR)

Bona Fide Academic Requirements (BFAR) (https://catalog.umanitoba.ca/graduate-studies/academic-guide/academic-performance-general/#BFAR) represent the core academic requirements a graduate student must acquire in order to gain, and demonstrate acquisition of, essential knowledge and skills.

All students must successfully complete:

- GRAD 7300 prior to applying to any ethics boards which are appropriate to the student's research or within the student's first year, whichever comes first; and
- GRAD 7500 within the first term of registration;

unless these courses have been completed previously, as per Mandatory Academic Integrity Course (https://catalog.umanitoba.ca/graduate-studies/academic-guide/academic-performance-general/#GRAD7500) and Mandatory Research Integrity Online Course (https://catalog.umanitoba.ca/graduate-studies/academic-guide/academic-performance-general/#GRAD7300).

Students must also meet additional BFAR requirements (https://umanitoba.ca/graduate-studies/student-experience/core-academic-requirements/#additional-requirements-by-program) that may be specified for their program.

General Regulations

All students must:

- maintain a minimum degree grade point average of 3.0 with no grade below C+,
- meet the minimum and not exceed the maximum course requirements, and
- meet the minimum and not exceed the maximum time requirements (in terms of time in program and lapse or expiration of credit of courses).