BIological systems engineering, M.S.

Graduate work in the Department of Biological Systems Engineering (BSE) leads to the master of science and doctor of philosophy degrees. Graduates of the program help fill the need for highly educated engineers in industry, consulting firms, government agencies, and educational institutions.

Students who undertake graduate studies in BSE normally have as their goal a better understanding of the current theories, principles, issues, and problems in biological systems. They desire a better understanding of how knowledge is generated, how it is critically evaluated, and how solutions to problems are generated. Graduate studies improve the ability of students to think critically and creatively, and to synthesize, analyze, and integrate ideas for decision making and problem solving.

The department offers students an opportunity to undertake research and advanced study in different specialization areas such as biological systems, environmental quality and natural resource engineering, waste management, food and bioprocess engineering and food safety, machinery systems, bioresources and biorefining, and agricultural safety and health.

Graduate research assistantships, project assistantships, and fellowships are available on a highly competitive basis.

Admissions

The department requires that students have a strong engineering background for admission to its graduate program. Most applicants have a bachelor of science degree from an ABET/EAC–accredited engineering program or an engineering undergraduate degree from an international institution. Applicants who do not have a bachelor of science degree from an ABET/EAC–accredited engineering program may be admitted with a stipulation that they complete supplemental work. Contact the department for details concerning additional requirements. Applicants are evaluated based on their academic record and educational objectives and letters of reference.

Graduate School Admissions

Graduate admissions is a two-step process between academic degree programs and the Graduate School. Applicants must meet requirements of both the program(s) and the Graduate School. Once you have researched the graduate program(s) you are interested in, apply online (https://grad.wisc.edu/admissions).

Funding

Graduate School Resources

Resources to help you afford graduate study might include assistantships, fellowships, traineeships, and financial aid. Further funding information (https://grad.wisc.edu/funding) is available from the Graduate School. Be sure to check with your program for individual policies and processes related to funding.

Requirements

Minimum Graduate School Requirements

Review the Graduate School minimum academic progress and degree requirements (http://guide.wisc.edu/graduate/#policiesandrequirementstext), in addition to the program requirements listed below.

Major Requirements

Mode of Instruction

<table>
<thead>
<tr>
<th>Mode of Instruction Definitions</th>
<th>Face to Face</th>
<th>Evening/Weekend</th>
<th>Online</th>
<th>Hybrid</th>
<th>Accelerated</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Mode of Instruction Definitions

**Evening/Weekend:** These programs are offered in an evening and/or weekend format to accommodate working schedules. Enjoy the advantages of on-campus courses and personal connections, while keeping your day job. For more information about the meeting schedule of a specific program, contact the program.

**Online:** These programs are offered primarily online. Many available online programs can be completed almost entirely online with all online programs offering at least 50 percent or more of the program work online. Some online programs have an on-campus component that is often designed to accommodate working schedules. Take advantage of the convenience of online learning while participating in a rich, interactive learning environment. For more information about the online nature of a specific program, contact the program.

**Hybrid:** These programs have innovative curricula that combine on-campus and online formats. Most hybrid programs are completed on-campus with a partial or completely online semester. For more information about the hybrid schedule of a specific program, contact the program.

**Accelerated:** These on-campus programs are offered in an accelerated format that allows you to complete your program in a condensed time-frame. Enjoy the advantages of on-campus courses with minimal disruption to your career. For more information about the accelerated nature of a specific program, contact the program.

Curricular Requirements

<table>
<thead>
<tr>
<th>Minimum Credit Requirement</th>
<th>30 credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Residence Credit Requirement</td>
<td>16 credits</td>
</tr>
</tbody>
</table>

Minimum Graduate Coursework Requirement

At least 50% of credits applied toward the graduate degree credit requirement must be in graduate level coursework; courses with the Graduate Level Coursework attribute are identified and searchable in the university’s Course Guide (https://registrar.wisc.edu/course-guide/).

Overall Graduate GPA Requirement

3.00 GPA required.
Other Grade Requirements
Graduate students in BSE must maintain a minimum overall B average (3.0 GPA) during their graduate studies. Seminars, research, or other special problems credits may not be used to offset BC or C grades. No grade below a C will be accepted for fulfilling course work requirements for the degree.

Assessments and Examinations
All students must complete a graduation checklist and be certified by the GIRC before taking their final oral examination.

Language Requirements
n/a

REQUIRED COURSES

Thesis Track 1
If your objective is to pursue a Ph.D. degree and/or research-oriented career, you are strongly encouraged to select the thesis option.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Credits</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Letter-graded UW-Madison course credits 3</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Thesis research credits</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Graduate seminar credits</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Biological Systems Engineering course credits 4</td>
<td>8</td>
</tr>
</tbody>
</table>

1 These tracks are internal to the program and represent different pathways a student can follow to earn this degree. Track names do not appear in the Graduate School admissions application, and they will not appear on the transcript.

2 Not including course credits taken to satisfy admission requirements.

3 At least six credits must be from coursework at the 500-level and above in science/engineering classes; can include up to six credits of science/engineering classes taken at 400-level and above as UW-Madison undergraduate.

4 For the two required graduate seminar credits, students typically take BSE 900 Seminar and BSE 901 Graduate Research Seminar.

Non-Thesis Track 1

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Credits</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Letter-graded UW-Madison course credits 3</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Independent study credits</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Graduate seminar credits</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Biological Systems Engineering course credits 4</td>
<td>8</td>
</tr>
</tbody>
</table>

1 These tracks are internal to the program and represent different pathways a student can follow to earn this degree. Track names do not appear in the Graduate School admissions application, and they will not appear on the transcript.

2 Not including course credits taken to satisfy admission requirements.

3 At least six credits must be from coursework at the 500-level and above in science/engineering classes; can include up to six credits of science/engineering classes taken at 400-level and above as UW-Madison undergraduate.

4 For the two required graduate seminar credits, students typically take BSE 900 Seminar and BSE 901 Graduate Research Seminar.

Other Requirements
Both thesis and non-thesis option students should select a committee of three faculty members in consultation with their major professors. For thesis option students, at least one of the committee members should be from another department. All students must present their research results at an oral final examination to the committee. All BSE graduate students are required to take BSE 900 Seminar within the first three semesters (offered fall semester only). All BSE graduate students are required and should take BSE 901 Graduate Research Seminar within the last two full semesters (offered spring semester only) of their graduation.

Graduate students should register for an appropriate number of credits of BSE 990 Research. If the student’s progress is satisfactory, the student will receive a grade of P (progress) for each semester of BSE 990 until the final semester. At that time all of these credits will be given an S (satisfactory) grade by the major professor.

POLICIES

GRADUATE SCHOOL POLICIES

The Graduate School’s Academic Policies and Procedures (https://grad.wisc.edu/acadpolicy) provide essential information regarding general university policies. Program authority to set degree policies beyond the minimum required by the Graduate School lies with the degree program faculty. Policies set by the academic degree program can be found below.

MAJOR-SPECIFIC POLICIES

GRADUATE PROGRAM HANDBOOK

The Graduate Program Handbook (https://bse.wisc.edu/graduate-studies/graduate-student-resources) is the repository for all of the program’s policies and requirements.

Prior Coursework

Graduate Work from Other Institutions
With approval of the Graduate Research and Instructions Committee, students are allowed to count no more than 9 credits of graduate coursework from other institutions. Coursework earned five or more years prior to admission to a master’s degree is not allowed to satisfy requirements.

UW–Madison Undergraduate
Students may count up to 6 credits of coursework 400-level and above from a UW–Madison undergraduate degree toward the degree. Coursework earned five or more years prior to admission to a master’s degree is not allowed to satisfy requirements.

UW–Madison University Special
With approval of the Graduate Research and Instructions Committee, students are allowed to count no more than 9 credits of coursework numbered 300 or above taken as a UW–Madison University Special student. Coursework earned five or more years prior to admission to a master’s degree is not allowed to satisfy requirements.

PROBATION

The Graduate School regularly reviews the record of any student who earned grades of BC, C, D, F, or Incomplete in a graduate course (300 or above), or grade of U in research credits. This review could
result in academic probation with a hold on future enrollment or in being suspended from the Graduate School.

**ADVISOR / COMMITTEE**

Every graduate student is required to have an advisor. To ensure that students are making satisfactory progress toward a degree, the Graduate School expects them to meet with their advisor on a regular basis.

An advisor generally serves as the thesis advisor. In many cases, an advisor is assigned to incoming students. Students can be suspended from the Graduate School if they do not have an advisor. An advisor is a faculty member, or sometimes a committee, from the major department responsible for providing advice regarding graduate studies.

A committee often accomplishes advising for the students in the early stages of their studies.

**CREDITS PER TERM ALLOWED**

12 credits

**TIME CONSTRAINTS**

Master’s degree students who have been absent for five or more consecutive years lose all credits that they have earned before their absence. Individual programs may count the coursework students completed prior to their absence for meeting program requirements; that coursework may not count toward Graduate School credit requirements.

**OTHER**

Funding decisions are made by faculty supervisors of the admitted students based on the funding availability and project need.

**PROFESSIONAL DEVELOPMENT**

Take advantage of the Graduate School's professional development resources (https://grad.wisc.edu/pd) to build skills, thrive academically, and launch your career.

**LEARNING OUTCOMES**

1. Articulates, critiques, or elaborates the theories, research methods, and approaches to inquiry or schools of practice in the field of study.

2. Identifies sources and assembles evidence pertaining to questions or challenges in the field of study.

3. Demonstrates understanding of the primary field of study in a historical, social, or global context.

4. Selects and/or utilizes the most appropriate methodologies and practices.

5. Evaluates or synthesizes information pertaining to questions or challenges in the field of study.

6. Recognizes and applies principles of ethical and professional conduct.

**PEOPLE**

**Faculty:** Professors Reinemann, Anex, Bohnhoff, Etzel, Gunasekaran, Hanna, Hartel, Holmes, Kammel, Karthikeyan, Kung, O'Leary, Pan, Ralph, Shinners, Straub, A. Thompson, Walsh; Associate Professor Runge (chair); Assistant Professors Digman, Larson, Luck