Department of Bioengineering
B.S./M.S. Program Handbook

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1. Program Description

The Department of Bioengineering at the University of Utah encourages undergraduate biomedical engineering (BME) students to become actively involved in research by joining one of numerous research laboratories affiliated with the department. The B.S./M.S. program is designed to take advantage of research completed as an undergraduate to potentially accelerate completion of the M.S. degree. A standard M.S. in Bioengineering typically requires 2 or more years of study beyond the B.S. degree; the B.S./M.S. program is intended to potentially shorten that time. Students in the B.S./M.S. program would begin research during the junior year and devote the summers after the junior and senior years to research and study. Research completed as an undergraduate can usually be applied toward partial fulfillment of the senior project requirements. In addition, some graduate courses taken during the senior year may count toward the M.S. coursework requirement if they are not needed to meet the B.S. coursework requirements.

To participate in the program, undergraduate students must apply for admission through the Department of Bioengineering by January 15 of the junior year (see Section 3 below). Recommendation for admission by the Department allows students to begin their M.S. research as undergraduates. The B.S. and M.S. degrees are conferred simultaneously following completion of the program.

2. Prior to Application to the B.S./M.S. Program

Applicants for admission to the B.S./M.S. program must have major status in BME at the University of Utah. Additionally, prospective applicants need to 1) take the GRE test and 2) identify an M.S. thesis advisor and develop a masters thesis project with the adviser. To be admitted it is necessary to demonstrate a clear research plan including commitment by a Bioengineering faculty member to serve as the M.S. thesis advisor.

3. Application to the B.S./M.S. Program

Applicants must apply by January 15 of the junior year to the Department of Bioengineering for acceptance into the B.S./M.S. program. Applications should be made online using the On-Line Fast Admissions Track (OLFAT) Form (*http://www.bioen.utah.edu/education/graduate/graduate_admissions/olfat.asp*); supporting material (including transcripts, GRE scores and recommendation letters) should be sent to the Department of Bioengineering Graduate Committee. A separate application for Graduate School Admission is not required at this time, but will be done later (see Section 4.4). All admissions requirements for the standard M.S. program remain in place with the following additions:

1) The applicant must indicate clearly at the beginning of the personal statement that the application is for the B.S./M.S. program.

2) The applicant must provide a brief description of the masters thesis project in the personal statement.

3) One of the three recommendation letters must come from a Bioengineering adjunct, research, or regular faculty member expressing a commitment to serve as the M.S. thesis

advisor. The M.S. thesis advisor must confirm in the recommendation letter that he or she has read and agreed to the brief description of the masters thesis project.

The application is processed and decisions are made by the Bioengineering Graduate Committee. Entrance criteria for the B.S./M.S. program are consistent with criteria for the traditional M.S. program. Notifications of admissions status will be made by March 15.

4. B.S./M.S. Program Requirements

The Bioengineering B.S./M.S. program meets the requirements of College of Engineering, the Graduate School and the University of Utah. Departmental requirements are noted below (Sections 4.1-4.5), followed by a model timeline and checklist for the combined program (Section 5).

4.1. B.S. and M.S. Requirements

Students must complete a minimum of 152 semester credit hours total of qualified studies. A minimum of 125 semester hours must meet the B.S. requirements of the Department. Of these, 3 credit hours at the 5000 or 6000 level may be transferred to the M.S. requirements. A minimum of 30 semester credit hours must meet the M.S. requirements of the Department.

B.S. Component

All requirements for the standard B.S. degree in BME remain in place. A detailed description of requirements for the B.S. degree in BME can be found in the Department of Bioengineering Undergraduate Handbook (*http://www.bioen.utah.edu/education/undergraduate/*) that was in effect at the time of admission to major status. A hard copy of the student's approved B.S. track course plan (the "blue sheet", previously approved by the Major Advisor) must be submitted to the Bioengineering graduate program secretary for placement in the student's file within one semester after admission to the combined program. Accompanying this sheet must be a hard copy of the required B.S. coursework that specifically applies to the student (this can be found in the Undergraduate Handbook in effect for the year the student was admitted to major status). Any approved changes in the track course plan must be submitted to the Bioengineering graduate program secretary as well.

M.S. Component

The M.S. degree in Bioengineering requires a thesis and a minimum of 30 semester credit hours at the 5000 level or above. Departmental requirements for the M.S. component of the combined program are noted below.

1) Required in the M.S. Program of Study (8 credit hours)
   - Physiology Fundamentals (6 cr total). Note that 3 credit hours must be one semester of Systems Physiology for Engineers (BIOEN 6000 or 6010, 3 cr each), and the other 3 credit hours must be advanced elective 6000+ biosciences courses to substitute for BIOEN 6050 Cellular Physiology. Examples of advanced biosciences courses can be found at *http://www.bioscience.utah.edu/curriculum/curriculum.html*.

- Biomedical literature survey (2 cr total) to substitute for BIOEN 6060/6061 Scientific Presentations (I)/(II). Examples of literature survey courses include BIOEN 6480 Biomechanics Seminar, BIOEN 7140 Advanced Topics in Tissue Engineering, and PHTX 6720 Developments in Neuropharmacology.

2) Electives (13 credit hours)

Advanced elective courses used to qualify for the M.S. component of the combined program must be approved by the M.S. research supervisory committee and be listed on the M.S. program of study (see Sections 4.2 and 4.3 below). At least 8 credit hours must be advanced elective 6000+ engineering courses. The M.S. thesis advisor should help the student develop the program of study. Links to examples of elective courses focused on important bioengineering specialties (i.e., Bioinstrumentation, Biomaterials, Biomechanics, Computational Bioengineering and Neural Interfaces) can be found on this website: *http://www.bioen.utah.edu/education/graduate/tracks.php*. Note that up to 3 credit hours at the 5000 or 6000 level may be transferred from the fulfillment of the BME B.S. course work requirements.

3) M.S. Thesis Research (9 credit hours) and Defense of the M.S. Thesis

An M.S. student must complete at least 9 credit hours of thesis research (BIOEN 6970) and defend his or her work in a public forum. Copies of the thesis must be given to the advisor, each member of the supervisory committee and to the Bioengineering executive secretary at least two weeks prior to the defense. The thesis presentation is followed by a closed session in which the thesis committee examines the candidate. The committee can pass the candidate, pass the candidate contingent upon the candidate's successfully responding to issues raised at the defense, or fail the candidate. M.S. candidates are given two opportunities to pass the defense. An original of the Report of the Final Oral Examination and Thesis for the Master's Degree (*http://www.bioen.utah.edu/forms/MS_final_exam.pdf*) signed by the M.S. research supervisory committee must be submitted to the Graduate Records Office, with copies to the Bioengineering graduate program secretary for the student file.

A Handbook for Theses and Dissertations containing information on the Graduate School's policies and procedures for preparing a thesis can be purchased in the Graduate Thesis Office (*http://www.utah.edu/gradschool/graduate_handbook/thesis_regs.html*). A student wishing to guarantee graduation in a specific semester must meet the deadlines listed in the Thesis Calendar and Masters Program Calendar posted at *http://www.utah.edu/gradschool/dates.html*.

4.2. M.S. Research Supervisory Committee: Filing the Request for Supervisory Committee Form

Within one semester after admission to the combined program, the student must form an M.S. research supervisory committee and submit the Request for Supervisory Committee Form *(http://www.bioen.utah.edu/forms/supervisory.pdf)* to the Bioengineering graduate program secretary. The research supervisory committee must consist of at least three University of Utah

faculty members. The chair of the committee must have a faculty appointment in the Department of Bioengineering and at least one of the committee members must be a tenure track member of the Bioengineering faculty. The advisor and committee must be approved by the Director of Graduate Studies (or Chairman) of the Department of Bioengineering.

4.3. M.S. Program of Study:

Filing the Application for Admission to Candidacy for the Master's Degree Form

Within one semester after admission to the combined program, the student must submit an M.S. program of study to the Bioengineering graduate program secretary (Application for Admission to Candidacy for the Master's Degree Form found at: *http://www.bioen.utah.edu/forms/MS_prog_study.pdf).* This form must first be approved and signed by the M.S. research supervisory committee and then by the Director of Graduate Studies (or Chairman) of the Department of Bioengineering. [Note: The Department will submit to the Graduate Records Office this completed and signed M.S. Candidacy form showing all courses taken, or to be taken, for the M.S. component of the combined program. The Department also attaches a copy of the B.S. course work plan showing what courses are being used to qualify for the B.S. component of the combined program.]

4.4. Progression to Graduate Status:

Filing the University of Utah Application to Graduate Admission Form

A student may request transfer to graduate status after completion of 122 semester credit hours of qualified studies. The student follows regular University of Utah Graduate School application procedures, and submits the 3-page University of Utah Application to Graduate Admission Form (*http://www.saff.utah.edu/admiss/appdownload/GradApp.pdf*) to the Bioengineering graduate program secretary. Specify the "year" and "semester" applying for on page 1. [Note: On the referral sheet that the Department returns to the Graduate Admissions Office, the Department will note that the student has been accepted to the B.S./M.S. program. Graduate Admissions will then approve admission without the B.S. having been completed.]

Students who are working on extramurally funded research projects may be eligible for the University of Utah's Graduate Tuition Benefit Program (TBP) for 5000-level and above courses once they obtain graduate status. TBP guidelines are posted at *http://www.utah.edu/gradschool*. Note that while students are enrolled with graduate status, all rules of the Graduate School apply (graduate tuition structure, graduate tuition benefit program, graduate student health insurance program, etc.). When deciding when to request change of status from undergraduate to graduate, students and M.S. advisors must read the TBP guidelines and weight benefits (e.g., tuition benefit and health insurance) vs. negatives (e.g., undergraduate scholarships not available, and higher tuition if you do not qualify for tuition benefit).

4.5. Graduation from the B.S./M.S. Program

The B.S. and M.S. degrees are conferred simultaneously following completion of the program. No student will be awarded a separate M.S. degree without satisfying all requirements for the B.S. degree.

5. Model Timeline and Checklist for the B.S./M.S. Program

Action	Timeline
Online Application to the B.S./M.S. Program	By January 15 of the junior year
Admission to the B.S./M.S. Program*	
Submit a **B.S. Course work Plan** (copy of "blue sheet" plus B.S. course work requirements from UG Handbook in effect at time of admission to major status)	Within a semester after admission
Establish an **M.S. Research Supervisory Committee** and Submit the **Request for Supervisory Committee Form**	Within a semester after admission
Develop an **M.S. Program of Study** and Submit the **Application for Admission to Candidacy for the Master's Degree Form**	Within a semester after admission
Submit the **University of Utah Application to Graduate Admission Form** and Transfer to **Graduate Status****	After completion of 122 credit hours of qualified studies
M.S. Thesis Defense and Submit the **Report of the Final Oral Examination and Thesis for the Master's Degree**	Within 24 months after admission
Final Reading Approval	
Graduation – Receive B.S. and M.S. Degrees Simultaneously***	Within 24 months after admission

* Prior to transferring to graduate status, B.S./M.S. students register as undergraduate students; all rules of the Undergraduate Program apply (undergraduate tuition structure, possible scholarships, etc.).

** While students are enrolled with graduate status, all rules of the Graduate School apply (graduate tuition structure, graduate tuition benefit program, graduate student health insurance program, etc.). Additionally, graduate students are not eligible to receive undergraduate scholarships.

*** Students must complete a minimum of 152 credit hours total of qualified studies (see Section 4.1).

6. Exiting the B.S./M.S. Program

Students wishing to exit the combined program can apply qualified coursework toward the traditional B.S. and M.S. degree requirements without penalty. In addition, admitted students who decide to receive the B.S. degree prior to completion of the B.S./M.S. program requirements must ***exit*** the combined program, but are given the option to enroll in the traditional M.S. program and are allowed to transfer eligible work ***not*** needed to meet the standard B.S. requirements to the standard M.S. requirements. An example is given below.

Exiting the Combined Program:

Action	Timeline
Online Application to the B.S./M.S. Program	By January 15 of the junior year
Admission to the B.S./M.S. Program*	
Submit a **B.S. Course work Plan** (copy of "blue sheet" plus B.S. course work requirements from UG Handbook in effect at time of admission to major status)	Within a semester after admission
Establish an **M.S. Research Supervisory Committee** and Submit the **Request for Supervisory Committee Form**	Within a semester after admission
Develop an **M.S. Program of Study** and Submit the **Application for Admission to Candidacy for the Master's Degree Form**	Within a semester after admission
Receive the B.S. Degree ** and Exit the Combined Program	End of the senior Year (15 months after admission)
Submit the **University of Utah Application to Graduate Admission Form**	End of the senior Year (15 months after admission)
Enroll as a Regular M.S. Student***	
M.S. Thesis Defense and Submit the **Report of the Final Oral Examination and Thesis for the Master's Degree**	Within 24 months after admission
Final Reading Approval	
Receive the M.S. Degree***	Within 24 months after admission

* Prior to transferring to graduate status, B.S./M.S. students register as undergraduate students; all rules of the Undergraduate Program apply (undergraduate tuition structure, possible scholarships, etc.).
** Students must complete all requirements for the standard B.S. degree in BME, including a minimum of 125 credit hours of qualified studies.
*** Students must still complete the requirements for the M.S. component of the combined program as described in Section 4.1, with the exception that students cannot transfer any credit hours needed for the fulfillment of the BME B.S. course work requirements to the M.S. requirements.

7. Notes

1) Students admitted to the combined B.S./M.S. program who subsequently seek admission or transfer to the Bioengineering Ph.D. program must follow the standard Ph.D. application process.

2) Admission and enrollment are subject to all rules and regulations of the Department, the College of Engineering, and the University of Utah Graduate School.