

# BIOMEDICAL ENGINEERING, M.S.

## Learning Outcomes

- The graduates will be able to demonstrate knowledge in Modeling and Simulation of Biomedical Systems. Specifically, the students should be able to describe the common features of mathematical and computational models used in Biomedical Engineering and be able to explain their utility and limitations. The attained level of expertise in the subject matter will be rated by the course instructor as 1- Poor/inadequate, 2-Fair, 3-Adequate, or 4-Excellent. Ratings will be reported to the graduate director.
- The graduates shall demonstrate knowledge in Human Cell and Molecular Biology. In addition to the acquired biological knowledge, the students will be able to articulate the application of this in biomedical engineering. The attained level of expertise in the subject matter will be rated by the course instructor as 1- Poor/inadequate, 2-Fair, 3-Adequate, or 4-Excellent. Ratings will be reported to the graduate director.
- The graduates shall demonstrate knowledge in Transport Phenomena in Biomedical Systems. The attained level of expertise in the subject matter will be rated by the course instructor as 1- Poor/inadequate, 2-Fair, 3-Adequate, or 4-Excellent. Ratings will be reported to the graduate director.
- The graduates shall demonstrate knowledge in Human Anatomy and Physiology for Biomedical Engineering. The attained level of expertise in the subject matter will be rated by the course instructor as 1- Poor/inadequate, 2-Fair, 3-Adequate, or 4-Excellent. Ratings will be reported to the graduate director.
- The graduates shall be able to assemble, interpret, summarize, and communicate information extracted from the scientific literature and focused on a topic related to biomedical engineering. The attained level of expertise in the subject matter will be rated by the course instructor as 1- Poor/inadequate, 2-Fair, 3-Adequate, or 4-Excellent. Ratings will be reported to the graduate director.

## Transfer Credit

Transfer credits from a previous graduate degree program must be approved by both BME and the Graduate School. The credits must be dated within the six-year period allowed for a Master's degree. A maximum of 12 credits can be transferred from another school with a grade of B or better.

## Other Program Requirements

Students are encouraged to plan their activities so as to complete the M.S. program of study within the recommended four semesters of full-time study (not counting summers). However, currently there is no imposed maximum allowed time for the completion of the M.S. program.

## Bachelor's/Master's Degrees Accelerated Program

The Bachelor's/Master's Degrees Accelerated Program in Biomedical Engineering allows undergraduate students to utilize as many as twelve credits of their undergraduate degree toward their M.S. degree. Only 500 level and above courses can be used for this purpose. Although it is not necessary, it is recommended that students interested in this

mechanism of transferring credits to enroll in core BMEN graduate courses (BMEN 710, BMEN 713, BMEN 720, and BMEN 723) as part of BS/MS studies.

## Program of Study

All students must consult with their academic advisor and complete a Program of Study form during the first semester of enrollment. A Program Adjustment form must be submitted whenever it is necessary to modify the program of study.

It is the goal of the Biomedical Engineering Program to have students, with the advice of their academic advisor, create a program of study that fits their interests while ensuring that they are well educated in the multidisciplinary area of Biomedical Engineering. To that end, all students must consult with their academic advisor and complete a Program of Study during the first semester of enrollment.

All Master's degrees require a minimum of 30 credit hours at the 500-level or above. An M.S. degree requires the successful completion of the course work described below as well as a thesis. Students earning an M.S. must have at least 7 hours of thesis preparation and only 7 hours of thesis preparation may be applied to the required 30 hours.

## Publication Requirement for M.S. Students

An educational objective for M.S. students is that they have the ability to communicate their research results through oral presentations and written publications. Consistent with this objective, an M.S. student is required to submit, based on research performed while at USC, at least one conference paper or one journal paper related to their current research topic prior to graduation.

## Master's Thesis

A thesis is required of all students seeking the M.S. degree. The student's academic advisor must approve the subject of the thesis. The Graduate School will furnish general thesis regulations upon request. Any student who wishes to use University facilities or to confer with the faculty on thesis work must be officially enrolled for thesis credit.

Students who plan to complete their Master's degree requirements during the summer must submit their thesis in sufficient time to ensure the approval and signature of the final draft and its delivery to the Graduate School, twenty (20) days prior to the end of the second summer session. The student should anticipate the absence of the professor for at least part of the summer. Information on the fees associated with the thesis submission is available in the Master's Thesis Guidelines or from the Graduate School.

## Thesis Committee

A student's M.S. Thesis Committee must consist of two faculty members, one of whom should be a BMEN faculty member. In addition to the two committee members, one designated graduate committee representative should be present at the time of examination.

## Thesis Presentation and Defense

The thesis presentation is to be open to all members of the University community and guests. During the Fall and Spring semesters, the presentation and defense are to be conducted during normal business hours and on a day that faculty are expected to be on campus. The

Graduate Director must approve the date and time of presentations given during the summer sessions.

At least 7 days prior to the thesis presentation and defense, the student must submit a printed copy of a complete thesis to the two members of the thesis committee and the Graduate Director. At least 14 days prior to the presentation and defense, a notice consisting of presentation title, abstract, time, place, and the names of the thesis committee advisors to be delivered to the Graduate Director. The notice is to be approved by the Graduate Director, dated and placed in the student's file. Using the information supplied, the Graduate Studies Committee will publicize the thesis and defense.

A Graduate Studies Committee representative will attend the presentation and defense. This representative will be selected by the Graduate Studies Committee and will be a faculty member who is not part of the student's thesis committee. This representative will report to the Graduate Studies Committee the results of the presentation and defense.

## **Graduation**

Within 15 days after the beginning of the semester of graduation, the student should submit an Application for Degree Form to the Graduate School. Dates for submission for each term are published by the USC Registrar's Office (<http://registrar.sc.edu/html/graduation/>). If a student fails to meet the requirements for graduation, a new application must be submitted for the subsequent graduation term.

## **Degree Requirements (30 Hours)**

The Master of Science (M.S.) degree in biomedical engineering (BMEN) requires 30 credit hours of graduate level work beyond the B.S. degree. Students must complete of 12 hours in core BMEN courses core BMEN courses (BMEN 710, BMEN 713, BMEN 720, and BMEN 723), 9 hours in BMEN or other approved electives, 1 hour in BMEN 795 seminar, 1 hour in BMEN 798 seminar, and 7 hours of BMEN 799, thesis preparation. The student must write and defend a thesis. The completed thesis must be submitted electronically with appropriate signatures to the Dean of the Graduate School.