BIOMEDICAL ENGINEERING (MS)

The Department of Biomedical Engineering offers degree programs leading to a Master of Science (M.S.) degree. Upon entering the M.S. program in Biomedical Engineering students are required to select their area of study or track in one of the following specialties: Biomaterials, Biomechanics, Biomedical Imaging and Biosensors, Bioinformatics and Systems Genomics, and Neuroengineering. Course requirements for the M.S. in Biomedical Engineering are determined in conjunction with the major advisor and advisory committee. Courses are selected from a track specific list of approved courses maintained on the Biomedical Engineering website. In addition to the standard M.S. program, the department also offers a path to the M.S. degree in Biomedical Engineering through a program tied to the Clinical Engineering Internship. This program has separate degree requirements, which include participation in a two-year off-site hospital based internship intended to train students to apply engineering skills to manage healthcare technology in the hospital environment. This program has a separate application process from the standard M.S. in Biomedical Engineering program.

Location

- Storrs Campus

Modality

- In Person

M.S. in Biomedical Engineering

The standard M.S. degree in Biomedical Engineering may be earned under either of two plans, as determined by the advisory committee. Plan A (thesis option) emphasizes problem-solving through research, while Plan B (non-thesis option) requires comprehensive understanding of a more general character through Biomedical Engineering coursework. In either case, advisory committees may require more than the minimum number of credits. Once a student begins a Plan A M.S. degree program and receives a graduate research assistantship, they can switch to a Plan B only if approved by the Biomedical Engineering Program Director and major advisor. It is also possible, with identification of a research project and approval from their major advisor, to change from Plan B M.S. degree program to Plan A.

M.S. Plan A Requirements

A minimum of 32 credit hours beyond the B.S. is required. The standard Plan A degree requires no fewer than seven graduate courses (21 credits) of advanced course work, a minimum nine additional credits of GRAD 5950 Master's Thesis Research or GRAD 5960 Full-Time Master's Research; two credit hours of Biomedical Engineering seminar; and successful completion of a thesis. The thesis must be an original and significant contribution to the field of Biomedical Engineering and must be defended orally according to Graduate School requirements. Students under Plan A are required to present and publish their Master's Thesis at a conference or have a paper accepted before graduation. For Plan A, the plan of study must include the following coursework: three graduate level engineering courses in the area of the student's research (nine credits); one life science course for three credits. Life science courses are typically selected from anatomy and physiology, cell and molecular biology or biophysical chemistry, but are not limited to these areas; one graduate level experimental design course with Biostatistics for three credits; two electives totaling six credits. These consist of graduate level courses selected in consultation with the major advisor in the area related to the student's research; nine credits of GRAD 5950 Master's Thesis Research or GRAD 5960 Full-Time Master's Research; two semesters, totaling two credits, one credit per semester, of graduate BME seminar; and all course work for the M.S. degree must be at the 5000-6000 level. BIST 5625 Introduction to Biostatistics can be used to satisfy the Experimental Design Course with Biostatistics requirement and BME 5000 Physiological Systems I to satisfy engineering or life science course requirement, even if these courses were used on a UConn undergraduate Plan of Study.

M.S. Plan B Requirements

The standard Plan B Master of Science in Biomedical Engineering requires a minimum of 32 credits consisting of ten graduate courses (30 credit hours) and two credit hours of Biomedical Engineering seminar. There are no publication requirements for Plan B M.S. degree students. For Plan B, the plan of study must include the following coursework: Five graduate level engineering courses in the student's track (15 credits); two life science courses (six credits). Life science courses are typically selected from anatomy and physiology, cell and molecular biology or biophysical chemistry, but are not limited to these areas; one graduate level experimental design course with Biostatistics for three credits; two electives totaling six credits. These consist of graduate level courses selected in consultation with the major advisor in the area related to the student's track; two semesters, totaling two credits, one credit per semester, of graduate BME seminar; at most, six credit hours or two classes may be transferred from other institutions, subject to department approval through a Graduate Petition and to the Graduate School regulations outlined in the Graduate Catalog; and all course work for the M.S. degree must be at the 5000-6000 level. BIST 5625 Introduction to Biostatistics can be used to satisfy the Experimental Design Course with Biostatistics requirement and BME 5000 Physiological Systems I to satisfy engineering or life science course requirement, even if these courses were used on a UConn undergraduate Plan of Study.

Course Substitutions

If a student has completed equivalent courses in a well-established graduate program, they can apply for a waiver by petitioning the Graduate Program Director by the end of the first semester. If a waiver is granted, the student may substitute elective graduate course credits for the waived course credits.

Independent Study Courses

For students under Plan B, at most three credit hours of independent study courses may be applied toward course work requirements. For students under Plan A, independent study is not allowed.

M.S. Final Examination

For students under Plan A, an oral examination, often called the thesis defense, is conducted based on the student's thesis research. The decision as to whether the student passes the examination is based on a vote of the advisory committee. For students under Plan B, the format and content of the final examination is determined by the advisory committee. A student must indicate the intention of graduation at least four weeks before the end of the graduate study to the major advisor who will make arrangement for the final examination. The decision as to whether the student passes the examination is based on a vote of the advisory committee.

M.S. in Biomedical Engineering (Clinical Engineering Internship Program)

The requirements for this program include a non-credit clinical internship, carried out off-site in hospitals throughout the United States, in addition to credit hour and other requirements described below. The degree is awarded as either Plan A (thesis option) or Plan B (non-thesis option). Plan A emphasizes problem-solving through research and requires a minimum of 21 credit hours of coursework and a Thesis Project, including nine credits of GRAD 5950 Master's Thesis Research. Plan B requires comprehensive understanding of a more general character and requires 30 hours of coursework.

Clinical Engineering Internship Program Requirements

A minimum of 30 credit hours beyond the B.S. is required. Plan A requires no fewer than seven graduate courses (21 credits) of advanced course work; a minimum nine additional credits of GRAD 5950 Master's Thesis Research or GRAD 5960 Full-Time Master's Research; and successful completion of a thesis. The thesis must be an original and significant contribution to the field of Biomedical Engineering and must be defended orally according to Graduate School requirements. Interns under Plan A are required to present and publish their Master‘s Thesis at a conference or have a paper accepted before graduation. Students pursuing the internship-based M.S. through Plan B must satisfactorily complete a minimum of 30 credits consisting of ten graduate courses (30 credit hours). There are no publication requirements for Plan B M.S. degree students.

Plan A Clinical Engineering Internship Requirements

BME 5020 Clinical Engineering Fundamentals, BME 5030 Human Error and Medical Device Accidents, BME 5040 Medical Instrumentation in the Hospital, BME 5050 Engineering Problems in the Hospital, BME 5060 Clinical Engineering Rotations I, BME 5061 Clinical Engineering Rotations II; nine credits of GRAD 5950 Master's Thesis Research or GRAD 5960 Full-Time Master's Research; and three credits of electives, these consist of graduate level courses selected from an approved list maintained on the Biomedical Engineering website. Other courses may be used to complete the elective requirement if approved by the major advisor. BIST 5625 Introduction to Biostatistics or BME 5000 can be used to satisfy the elective requirement, even if the course is used on a UConn undergraduate Plan of Study.

Plan B Clinical Engineering Internship Requirements

BME 5020 Clinical Engineering Fundamentals, BME 5030 Human Error and Medical Device Accidents, BME 5040 Medical Instrumentation in the Hospital, BME 5050 Engineering Problems in the Hospital, BME 5060 Clinical Engineering Rotations I, BME 5061 Clinical Engineering Rotations II; and 12 credits of electives, these consist of graduate level courses selected from an approved list maintained on the Biomedical Engineering website. Other courses may be used to complete the elective requirement if approved by the major advisor. BIST 5625 Introduction to Biostatistics and BME 5000 can be used to satisfy an elective requirement, even if these courses were used on a UConn undergraduate Plan of Study.

Course Substitutions

If a student has completed equivalent courses in a well-established graduate program, they can apply for a waiver by petitioning the Graduate Program Director by the end of the first semester. If a waiver is granted, the student may substitute elective graduate course credits for the waived course credits.

Independent Study Courses

For students under Plan B, at most three credit hours of independent study courses may be applied toward course work requirements. For students under Plan A, independent study is not allowed.

M.S. Final Examination

For students under Plan A, an oral examination, often called the thesis defense, is conducted based on the student’s thesis research. The decision as to whether the student passes the examination is based on a vote of the advisory committee. For students under Plan B, the format and content of the final examination is determined by the advisory committee. A student must indicate the intention of graduation at least four weeks before the end of the graduate study to the major advisor who will make arrangement for the final examination. The decision as to whether the student passes the examination is based on a vote of the advisory committee.

Learning Objectives

1. Knowledge: Demonstrate appropriate breadth and depth of disciplinary knowledge and comprehension of the major topics, theories, and issues of a discipline within Biomedical Engineering.
2. Research/applied skills: Uses, disaggregates, reformulates and/or adapts principal ideas, techniques or methods of the field of study.
3. Communication: Communicate proficiently and effectively to technical (e.g., engineers, clinicians, scientists) and non-technical audience, verbally and in writing, a coherent argument or explanation summarizing aspects of the discipline within Biomedical Engineering.
4. Ethics/Professional behavior: Conduct themselves in accordance with the highest ethical and responsible standards, values, and, where these are defined, the best practices of the discipline.