

Integrated BSBME/MSE program

If the proposal has potential budgetary impacts for another college/school, such as requiring new sections or a non-negligible increase in the number of seats offered, at least one contact must be at the college-level.

How many students do you expect to be impacted?

Impacted schools must be contacted and their response(s) included:

Person communicated with:

Date of communication:

Response:

- E. Does this proposal involve changes to the core curriculum or other basic education requirements (42-hour core, signature courses, flags)? If yes, explain:

If yes, Undergraduate Studies must be informed of the proposed changes and their response included:

Person communicated with:

Date of communication:

Response:

- F. Will this proposal change the number of hours required for degree completion? **No**

Note: THECB Semester Credit Hour Change Form required, download from URL:

<http://www.thecb.state.tx.us/reports/docfetch.cfm?Docid=2419&format=doc>

If yes, explain:

5. COLLEGE/SCHOOL APPROVAL PROCESS

Department approval date: April 27, 2017

Approved by whom: Biomedical Engineering Faculty

College approval date: May 24, 2017

Approved by whom: CSE Degrees & Courses Committee

Dean approval date: Sept. 18, 2017

Approved by whom: CSE Faculty: Sharon L. Wood, Dean

PROPOSED NEW CATALOG TEXT:^{iv}

BACHELOR OF SCIENCE IN BIOMEDICAL ENGINEERING

[text unchanged]

Portable Computing Devices

[text unchanged]

Student Outcomes

[text unchanged]

Program Educational Objectives

[text unchanged]

Curriculum

[text unchanged]

Integrated BSBME/MSE program

The integrated degree program results in simultaneously awarding a Bachelor of Science in Biomedical Engineering (BSBME) and a Master's of Science in Engineering (MSE) degree offered by the graduate program in biomedical engineering. The objective of the Integrated BSBME/MSE Program is to enable prepared undergraduates in Biomedical Engineering to earn two degrees in a shortened time period. Through implementing a simplified

Integrated BSBME/MSE program

admission process and allowing seniors to enroll in graduate-level engineering courses reserved for graduate credit, the program enables graduates to complete both degree requirements within five years.

Admissions. Current undergraduate BME students may begin the application process to the Integrated BSBME/MSE Program option in the first term of their third year. Admission includes the two steps outlined below. Undergraduate students not in the biomedical engineering major are not eligible to apply. It is expected that all students selected for the program in Step 1 and have been successful in their first graduate-level coursework will be selected for admission in Step 2. Successful completion will be evaluated and determined by the department's Domestic Graduate Admission Committee and the Graduate Advisor.

Step 1. Students go through the first step in application for admission to the Integrated BSBME/MSE Program in the first term of the third year. The Step 1 application is internal through the department and includes a resume, statement of purpose, and letters of recommendation. Qualified applicants will be selected based on the applicant's progress to degree completion, grade point average, and other qualifications included in the application materials. Selected students will be notified early in the second term of the third year of their admission status for the integrated program, allowing them to meet with an Academic Advisor to plan graduate coursework in the first term of their fourth year.

Step 2. Students go through the second step in the application after the first term of their fourth year. The Step 2 application is formal through the Graduate and International Admission Center (GIAC) and includes a resume, statement of purpose, letters of recommendation, and a TOEFL score (if required). Qualified applicants will be selected based on success in graduate-level engineering courses in the first term of their fourth year, grade point average, and other qualifications included in the application materials. Graduate Record Exam (GRE) test scores are not required for admission to the integrated program, however students interested in continuing on to a doctoral program are strongly encouraged to take the GRE.

If a student in their fourth year is taking graduate courses and would be on track to complete the integrated program but did not apply in their third year through Step 1, they may also choose to apply in Step 2 and formally apply through GIAC. These students will be evaluated for admission on the same criteria.

Degree Requirements. In order for integrated program students to complete both the BSBME and MSE degrees in five years, the department waives 6 semester credit hours (SCH) of technical area electives in lieu of 6 SCH of graduate engineering coursework reserved for graduate credit taken in the fourth year. This reduces the total BSBME degree requirements for integrated program students from 133 to 127 SCH. The remaining required 6 SCH of technical area electives required for the BSBME degree must be taken in engineering (see Technical Area Options section below).

Students in the integrated program complete 12 SCH of graduate coursework in their fourth year and 18 SCH of graduate coursework in their fifth year to complete a total of 30 SCH of graduate coursework for the MSE degree as described in the Graduate Catalog. Students have the option of choosing the coursework or thesis options for the MSE degree as described in the Graduate Catalog. Which courses the student takes will be determined with the Graduate Advisor and Academic Advisor to ensure compliance with degree requirements and meet the students' career goals.

Students unable to successfully complete the integrated program, or who wish to terminate pursuit of the MSE for any reason, may obtain a BSBME degree by satisfying all of the requirements for the standalone degree. Two of the graduate courses (6 SCH) taken in the fourth year may count toward the 12 SCH of technical area electives required to complete the entire 133 SCH requirements. An undergraduate student leaving the integrated program will be on a trajectory to graduate with the regular BSBME degree in the same timeframe prior to admission to the integrated program.

Graduates of the integrated program will receive the BSBME and MSE degrees simultaneously after successfully completing the 127 SCH for the BSBME and 30 SCH for the MSE, a total of 157 SCH. It is expected that students in this program will graduate with both degrees in a total of five years to completion.

Integrated BSBME/MSE program

Advising. Once admitted, students will be advised each semester by the Graduate Advisor and an Academic Advisor to complete coursework required for the BSBME degree in their fourth year, and completion of the coursework required for the MSE degree in their fourth and fifth years.

Information regarding the integrated program requirements and policies may be obtained from the BME Academic Advising Office in BME 3.308.

[No further changes in this proposal]

Integrated BSBME/MSE program

Summary

INTEGRATED PROGRAM RESULTING IN THE SIMULTANEOUS AWARDING OF A BACHELOR OF SCIENCE IN BIOMEDICAL ENGINEERING AND MASTER OF SCIENCE IN ENGINEERING

The Department of Biomedical Engineering (BME) seeks approval to create an integrated degree program leading to the simultaneous awarding of the Bachelor of Science in Biomedical Engineering (BSBME) and Master of Science in Engineering (MSE) degrees in five years. The program will have a two-part admissions process. BME undergraduate students will apply for provisional admission to the BSBME/MSE integrated degree program in their third year by submitting an application to the Department of Biomedical Engineering. If accepted, students will complete a modified BSBME degree option and begin taking graduate courses during their senior year, reserving 12 SCH of this coursework for graduate credit. Students who successfully complete this graduate coursework will apply for formal admission to the Graduate School during their fourth year by submitting an application to the Graduate and International Admissions Center. The BSBME and MSE degrees will be awarded simultaneously when the student has completed the requirements of both programs at the end of the fifth year.

This proposal follows the structure of the five-year integrated program offered by the Department of Electrical and Computer Engineering at The University of Texas at Austin. The proposed program is similar to integrated bachelor's/master's, 5-year programs offered at top-ranked, peer biomedical engineering departments such as at the University of Washington and University of Michigan.

The program serves three primary goals: (1) provide graduates with further employability in a complex medical device and biotech industry where an advanced degree is often essential; (2) allow the high number of graduates (~40%) from our program who are already going to advanced degree programs to reduce forgone earnings and increase lifetime earnings by entering the workforce or doctoral programs earlier with an advanced degree; and (3) recruit top high school students that would otherwise consider our top-ranked, peer schools to participate in an integrated program.

The BSBME/MSE integrated degree program will provide a shortened degree completion path for the biomedical engineering undergraduates to earn both degrees in five years. Currently the standalone BSBME degree plan requires 12 SCH of technical-area electives. In the integrated program option, 6 of these hours will be waived based on completion of 6 SCH of graduate-level engineering coursework taken for the MSE degree. The remaining 6 SCH in undergraduate coursework counting toward the BSBME technical-area electives requirement must be taken in engineering, per the 2018-2020 *Undergraduate Catalog*. The modified BSBME degree option will reduce the overall BSBME degree requirements from 133 to 127 SCH for students in the integrated program and maintains more than the minimum number of engineering credits required by ABET.

Students in the BSBME/MSE integrated program will reserve a total of 12 SCH of graduate engineering coursework for graduate credit in their fourth year. The MSE degree requires completion of 30 SCH and includes coursework and thesis degree options. Students in the BSBME/MSE integrated program will finish the remaining 18 SCH required for the MSE degree in one year (9 SCH per semester), thereby completing requirements for both degrees in 5 years.

Integrated BSBME/MSE program

Proposal for an Integrated Program Resulting in the Simultaneous Awarding of

Bachelor of Science in Biomedical Engineering

and

Master of Science in Engineering

To be effective Fall 2018

The Department of Biomedical Engineering

The Cockrell School of Engineering

Integrated BSBME/MSE program

Table of Contents

Rationale	8
Program Need	8
Program Demand	8
Similar Programs.....	8
<i>University of California San Diego: 5 Year BS/MS Program in Bioengineering</i>	8
<i>University of Washington: Combined BS/MS in Bioengineering</i>	9
<i>University of Michigan: Combined BSE/MSE in Biomedical Engineering</i>	9
Program Description	9
Program Objectives	9
Admission Requirements and Process	9
<i>Step 1: Internal Admission Process and Requirements</i>	10
<i>Step 2: Graduate School Admission Process and Requirements</i>	10
Degree Requirements	11
<i>Bachelor's Degree</i>	11
<i>Master's Degree</i>	11
<i>Catalog Statement</i>	11
<i>Academic Policies for Continuance</i>	13
<i>Probation and Dismissal</i>	13
Program Administration and Academic Advising	13
Relationship to Existing Authorized Programs.....	13
Effects on Existing Authorized Programs	13
Expected Enrollment	14
Resources	14
Courses	14
Faculty.....	14
Facilities and Equipment.....	14
Libraries	14
Appendices.....	15
Appendix A – BSBME Suggested Arrangement of Courses.....	16
Appendix B – BSBME Suggested Arrangement of Courses for Integrated Program	18
Appendix C – BSBME Credit Hours by Subject Area	20
Appendix D – BSBME Credit Hours by Subject Area for Integrated Program	23
Appendix E – MSE Program of Work (Coursework).....	26
Appendix F – MSE Program of Work (Thesis)	27

Integrated BSBME/MSE program

Rationale

The Department of Biomedical Engineering (BME) seeks approval to create an integrated degree program leading to the simultaneous awarding of a Bachelor of Science in Biomedical Engineering (BSBME) degree and a Master of Science in Engineering (MSE) degree in five years.

Program Need

The proposed BSBME/MSE integrated degree program addresses identified needs of biomedical engineering graduates to: (1) graduate with further employability in a complex biomedical and biotech industry where an advanced MSE or PhD degree is often required; (2) reduce forgone earnings and increase lifetime earnings by entering the workforce or doctoral program earlier with a MSE degree; and (3) recruit top high school students that would otherwise favor offers from our top-ranked, peer schools to participate in an integrated program.

In annual graduating senior exit interviews with the department chair, biomedical engineering students have expressed interest in an integrated bachelor's and master's program. In this academic year, the Department of Biomedical Engineering's newly formed Undergraduate Advisory Board—whose mission as representatives of the undergraduate student population is to provide advice to the department on curriculum, community, and facilities—recommended the department consider offering an integrated program to help prepare students for careers in industry and PhD programs, make the most of undergraduate research experiences within the department, and make the most of the 133 semester credit hours required in the BSBME degree program.

Furthermore, many students in BME already earn a significant number of credits due from Advanced Placement in high school and have time in their course schedules during their senior year to take more coursework and participate in more research. A combined five-year plan will allow these students to use their available time to take graduate courses and build on existing research experience toward earning a master's degree.

Program Demand

Combined bachelor's and master's programs are available at a number of top-ranked biomedical engineering departments in the United States. In addition to the demand from current students, the proposed program will allow The University of Texas at Austin to compete for the top high school graduates in the state of Texas by offering the opportunity to earn two degrees in five years from an in-state, major, public, research institution. Top out-of-state bioengineering and biomedical engineering competitive programs—such as University of California San Diego, University of Washington, University of Michigan, and University of California Berkeley—offer a five-year, combined-program option.

Admission to the BME undergraduate program at UT Austin is very selective, offering a seat to one in every eleven applicants selecting BME as their first choice of major on the ApplyTexas application. This selectivity indicates the high quality of the program and the impressive academic accomplishments of our admits, for which UT Austin must compete against other top programs. The proposed BSBME/MSE integrated degree program will increase UT Austin's ability to recruit these top students.

Similar Programs

University of California San Diego: 5 Year BS/MS Program in Bioengineering

The UC San Diego integrated Bachelor of Science and Master of Science in Bioengineering program is open to current UCSD bioengineering undergraduates. Students apply in their junior year. Admission criteria include a minimum 3.5 upper-division GPA and 3.0 UC overall GPA. Twelve units of graduate coursework is completed in the senior year which will count toward the MS degree¹. Students can arrange for coursework to fulfill both BS and MS degree requirements. In the fifth year, students complete the remainder of MS degree coursework requirements.

¹ This proposed program follows a similar arrangement to UCSD, allowing current juniors to apply; as seniors, integrated program seniors take up to 12 semester credit hours of graduate classes reserved for MSE credit.

Integrated BSBME/MSE program

University of Washington: Combined BS/MS in Bioengineering

The UW Bachelor of Science and Master of Science in Bioengineering is open to UW bioengineering students who have earned their BS. Students begin research as undergraduates with a faculty advisor and this research mentorship continues another year to allow the student to meet the MS thesis requirements². The summer following the senior year is spent on research. The students' fifth year focuses on 30 credits of coursework (three quarters with 10 credits per term), continued research, and thesis writing and defense. Students are expected to finish the MS within one year after BS completion.

University of Michigan: Combined BSE/MSE in Biomedical Engineering

The Michigan Sequential Undergraduate/Graduate Studies (SUGS) program is open to UM undergraduate biomedical engineering students. The combined BSE/MSE plan allows up to nine eligible graduate credits to fulfill requirements for both the BSE and MSE degree plans, thereby shortening time to completion of the MSE degree to one year³. BSE students apply for the program before graduating and remain one more year to finish remaining MSE requirements after double-counting credits are determined.

Program Description

Program Objectives

The objective of the BSBME/MSE integrated program is to enable prepared undergraduates in Biomedical Engineering to earn two degrees in a shortened time period. Through offering an early-entry point for qualified seniors and allowing seniors to enroll in graduate-level engineering courses reserved for graduate credit, the program enables graduates to complete both degree requirements within five years.

Admission Requirements and Process

Admission to the Integrated BSBME/MSE Program will happen in two steps. Step 1 will happen in the first term of the third year and will consist of an internal application to the Department of Biomedical Engineering. Step 2 will happen in the second term of the fourth year and will consist of a formal application to UT Austin's Graduate and International Admissions Center. Academic Advisors in the Department of Biomedical Engineering will offer information sessions each semester to current BSBME students covering the integrated-program requirements, processes, and benefits of participation. Attending an information session will not be required to apply. **Figure 1** illustrates the overall timeline for admission and program completion.

Figure 1 *Integrated Program Admission Timeline*

Year	Semester	Educational Activities	Integrated Program Admission
1	Fall-Spring	Completion of Y1 BSBME requirements	N/A
2	Fall-Spring	Completion of Y2 BSBME requirements	Attend program info session (optional)
3	Fall	Completion of Y3 BSBME requirements	Step 1 Application Submission to Department of BME
3	Spring	Completion of Y3 BSBME requirements	Step 1 Admission Decision; program advising for Y4 before registration in April

² The proposed program also allows undergraduate researchers to continue their research mentorship and expand on it to a graduate-level in their fourth and fifth years, enabling them to finish the MSE with thesis option.

³ The proposed program does not include double-counting credit hours for both degrees, but similarly reduces BSE degree technical area credit requirements by waiving 6 SCH of those requirements in lieu of 6 SCH of engineering graduate credit.

Integrated BSBME/MSE program

4	Fall	Completion of Y4 BSBME requirements; completion/ reservation of 6 SCH of graduate coursework toward MSE	
4	Spring	Completion of fourth-year BSBME requirements, less 6 SCH technical area electives; completion/ reservation of 6 SCH of graduate coursework toward MSE	Step 2 Application Submission to Graduate & International Adm. Center; Step 2 Admission Decision; program advising for Y5 before registration in April
5	Fall-Spring	Completion of 18 SCH graduate toward MSE	Classified as Master's student
5	Spring	Graduation: Simultaneous awarding of BSBME and MSE degrees	

Step 1: First Admission Process (Provisional Admission by Department of BME)

Only current undergraduate BME students in good academic standing may apply to the BSBME/MSE integrated program. The optimal time for students to apply is in the first term of the third year, prior to rising-senior academic advising and registration for the following fall. Application materials, deadlines, and information on procedures will be available online and in the BME Academic Advising Office in BME 3.308.

Qualified students will be selected in the Step 1 admissions process by the department's Domestic Graduate Admissions Committee (a subset of the BME Graduate Studies Committee). Admissions will be based on a review of the applicant's GPA, resume, and letters of recommendation. Selected individuals will be required to meet with the Graduate Advisor and Academic Advisor to review requirements for the integrated program, plan a path for completion, and be authorized for graduate courses selected for their fourth year. This advising process will also guide students through the selection of a research advisor if one has not already been selected, in the case that the student wishes to pursue the Thesis option of the MSE degree. Integrated-program advising will also include post-graduation planning to allow the student to select coursework and activities to meet their individual goals, such as taking the GRE or planning for internships. At this stage, the cohort of Integrated Program juniors and seniors will also have the opportunity to form a support community as they persist through the program together.

Students who are not selected for admission to the integrated program will receive advising and guidance from the Graduate Advisor designed to strengthen future applications to other MS/MSE/PhD programs.

Step 2: Second Admission Process (Formal Admission by Graduate School)

Before the beginning of the fifth year of the program, students in the integrated program must be formally admitted to the Graduate School as master's students. Students will complete Step 2 of the integrated-program's application process by applying for formal admission to the Graduate School in the second term of their fourth year. Application forms must be completed and submitted to the Graduate and International Admissions Center (GIAC).

Admission to the integrated program will be based on a review of the applicant's undergraduate record and GPA, GRE scores, performance in graduate coursework, letters of recommendation, personal statement, TOEFL score (if required), and research experience.

It is expected that all students who are provisionally admitted to the integrated program in Step 1 and who are successful in completing graduate-level coursework during their senior year will be selected for formal admission to the Graduate School in Step 2. Admission decisions will be made again by the department's Domestic Graduate Admissions Committee and the Graduate. Students who are selected will be enrolled in the Graduate School and classified as master's-level students in the fifth year.

In the rare case that an applicant who was admitted in Step 1 is denied admission in Step 2, the student will be advised by the Graduate Advisor regarding the reason and provided guidance to strengthen future applications to other programs. The department will request that any graduate coursework reserved for graduate-credit be reverted to count toward the standalone BSBME degree 133 SCH requirements, so the student may graduate on time.

Integrated BSBME/MSE program

Degree Requirements

Bachelor's Degree

The standalone BSBME degree requires 133 SCH of coursework, 12 of which are to be fulfilled through technical-area electives. In order for the integrated program students to complete both the BSBME and MSE degrees in five years, the proposal seeks a modification to the BSBME degree requirements to waive 6 SCH of technical area electives in lieu of 6 SCH of graduate engineering coursework. This will reduce the total number of hours required for the BSBME degree within the integrated-program arrangement to 127 SCH, thus exceeding the University's 120 SCH minimum for bachelor's degrees.

As is very common among BME undergraduates, it is expected that students in the BSBME/MSE integrated program will complete approximately 15 SCH of coursework required for the BSBME degree through advanced placement credit (CR) for core curriculum and basic science coursework. This will reduce the amount of BSBME-related coursework to be completed in the fourth year and will provide students with time in their course schedules to register for graduate coursework that can be reserved for graduate credit and later applied towards their MSE degree requirements. [Appendix A](#) includes the suggested arrangement of coursework for the standalone BSBME degree, and [Appendix B](#) includes the comparable suggested arrangement of coursework for the BSBME degree within the integrated-program arrangement.

To maintain the minimum engineering credits required for engineering accreditation through ABET⁴, students in the integrated program must fulfill 6 SCH of technical-area electives through engineering coursework. This prohibits any coursework in the natural sciences, math, or other fields other than engineering to count toward the 6 SCH technical-elective requirement in the BSE portion of the integrated program. [Appendix C](#) includes the ABET table of semester credit hours by subject area in the current standalone BSBME degree. [Appendix D](#) includes the same table of hours by subject for the BSBME degree in the integrated program whereby 6 SCH of math and science electives are waived, demonstrating that the integrated program maintains the ABET Criterion 5 Curriculum minimum requirements for accreditation⁵.

Master's Degree

There are no changes to the MSE degree requirements. Students in the BSBME/MSE integrated program can choose to complete 30 SCH of coursework, or 24 SCH of coursework with 6 SCH of thesis coursework. [Appendix E](#) includes the program of work form for the coursework option, and [Appendix F](#) includes the proposed program of work for the thesis option.

Catalog Statement

The following is the proposed 2018-2020 Undergraduate Catalog Bachelor of Science in Biomedical Engineering statement:

Integrated BSBME/MSE program

The integrated degree program results in simultaneously awarding a Bachelor of Science in Biomedical Engineering (BSBME) and a Master of Science in Engineering (MSE) degree offered by the Department of Biomedical Engineering. The objective of the Integrated BSBME/MSE Program is to enable prepared undergraduates in Biomedical Engineering to earn two degrees in a shortened time period. Through implementing a simplified admission process and allowing seniors to enroll in graduate-level engineering courses reserved for graduate credit, the program enables graduates to complete both degree requirements within five years.

⁴ ABET is a nonprofit, non-governmental organization that accredits all Cockrell School of Engineering bachelor's degrees at The University of Texas at Austin per state requirements.

⁵ The Engineering Accreditation Commission of ABET requires a minimum of 48 SCH of engineering topics and 32 SCH of math and basic science topics.

Integrated BSBME/MSE program

Admissions. Current undergraduate BME students may begin the application process to the Integrated BSBME/MSE Program option in the first term of their third year. Admission includes the two steps outlined below. Undergraduate students not in the biomedical engineering major are not eligible to apply. It is expected that all students selected for the program in Step 1 and have been successful in their first graduate-level coursework will be selected for admission in Step 2. Successful completion will be evaluated and determined by the department's Domestic Graduate Admission Committee and the Graduate Advisor.

Step 1. Students go through the first step in application for admission to the Integrated BSBME/MSE Program in the first term of the third year. The Step 1 application is internal through the department and includes a resume, statement of purpose, and letters of recommendation. Qualified applicants will be selected based on the applicant's progress to degree completion, grade point average, and other qualifications included in the application materials. Selected students will be notified early in the second term of the third year of their admission status for the integrated program, allowing them to meet with an Academic Advisor to plan graduate coursework in the first term of their fourth year.

Step 2. Students go through the second step in the application in the second term of their fourth year. The Step 2 application is formal through the Graduate and International Admission Center (GIAC). Admission to the integrated program will be based on a review of the applicant's undergraduate record and GPA, GRE scores, performance in graduate coursework, letters of recommendation, personal statement, TOEFL score (if required), and research experience.

If a student in their fourth year is taking graduate courses and would be on track to complete the integrated program but did not apply in their third year through Step 1, they may also choose to apply in Step 2 and formally apply through GIAC. These students will be evaluated for admission on the same criteria.

Degree Requirements. In order for integrated program students to complete both the BSBME and MSE degrees in five years, the department waives 6 semester credit hours (SCH) of technical area electives in lieu of 6 SCH of graduate engineering coursework reserved for graduate credit taken in the fourth year. This reduces the total BSBME degree requirements for integrated program students from 133 to 127 SCH. The remaining required 6 SCH of technical area electives required for the BSBME degree must be taken in engineering (see Technical Area Options section below).

Students in the integrated program complete 12 SCH of graduate coursework in their fourth year and 18 SCH of graduate coursework in their fifth year to complete a total of 30 SCH of graduate coursework for the MSE degree as described in the Graduate Catalog. Students have the option of choosing the coursework or thesis option for the MSE degree as described in the Graduate Catalog. Which courses the student takes will be determined with the Graduate Advisor and Academic Advisor to ensure compliance with degree requirements and meet the students' career goals.

Students unable to successfully complete the integrated program, or who wish to terminate pursuit of the MSE for any reason, may obtain a BSBME degree by satisfying all of the requirements for the standalone degree. 6 SCH of the graduate courses taken in the fourth year may count toward the 12 SCH of technical area electives required to complete the entire 133 SCH requirements. An undergraduate student leaving the integrated program will be on a trajectory to graduate with the regular BSBME degree in the same timeframe prior to admission to the integrated program.

Graduates of the integrated program will receive the BSBME and MSE degrees simultaneously after successfully completing the 127 SCH for the BSBME and 30 SCH for the MSE, a total of 157 SCH. It is expected that students in this program will graduate with both degrees in a total of five years to completion.

Advising. Once admitted, students will be advised each semester by the Graduate Advisor and an Academic Advisor to complete coursework required for the BSBME degree in their fourth year, and completion of the coursework required for the MSE degree in their fourth and fifth years.

Information regarding the integrated program requirements and policies may be obtained from the BME Academic Advising Office in BME 3.308.

Integrated BSBME/MSE program

Academic Policies for Continuance

Students admitted to the integrated program are expected to continue to make progress toward both degrees each semester starting in the first term of their fourth year. Each semester, integrated program students will be required to meet with the Graduate Advisor or Academic advisor to review satisfactory progress. All integrated program students must maintain a minimum 3.0 cumulative, in-residence GPA in both programs.

Probation and Dismissal

An integrated program student in undergraduate standing whose GPA falls below a 3.0 will be placed on probation with respect to the BSBME/MSE integrated program and, by University policy, will be unable to take graduate courses. A student in graduate standing whose GPA falls below a 3.0 will be placed on probation in accordance with Graduate School policies.

Students in undergraduate standing on probation who fail to attain a satisfactory cumulative GPA of 3.0 at the end of the next term of enrollment are subject to possible dismissal from the integrated program. Students will be allowed to complete the BSBME standalone degree requirements and graduate at the end of their fourth year with one degree. Students in graduate standing on probation who fail to attain a satisfactory cumulative GPA of 3.0 at the end of the next term of enrollment are subject to possible dismissal from the graduate program. The department would petition the Graduate School to revert graduate courses reserved for graduate credit back to count toward undergraduate degree requirements for these students to finish the BSBME standalone degree on time.

Program Administration and Academic Advising

The BME Graduate Studies Committee (GSC) will serve as the oversight committee for the MSE portion of the integrated degree program. The Undergraduate Curriculum Committee (UGCC) will serve as the oversight committee for the BSBME portion of the integrated program. The Graduate Advisor and Academic Advising Coordinator of the standalone MSE and BSBME programs, respectively, will administer the integrated degree program. Integrated program students will remain classified as undergraduate students through their fourth year. After successfully completing the second step of the admissions process, students will begin their fifth year in graduate standing classified as master's students.

Students in the BSBME/MSE integrated program will be required to meet with an Academic Advisor each semester prior to registration; this will be enforced through an advising registration bar. Academic advisors will ensure integrated program students have completed all requirements for the BSBME degree by the end of the fourth year. Academic Advisors will work closely with the Graduate Advisor to guide students in the selection of up to 12 SCH of graduate coursework that will be completed and reserved for graduate credit in the fourth year, and 18 SCH of graduate coursework that will be completed in the fifth year. Per University policy, undergraduate students may not reserve more than 12 SCH of coursework for graduate credit. Academic Advisors and the Graduate Coordinator will work closely to ensure students complete the requirements of the MSE degree by the end of the fifth year.

Relationship to Existing Authorized Programs

The integrated program provides an early entry point into the current MSE program for talented BME undergraduates. Admissions processes will be kept commensurate with those of the regular program, with the exception of waiving the GRE scores requirement, to maintain the quality of the graduate student body. Students in the integrated program will enroll in the same graduate coursework as students admitted to the standalone graduate programs.

Effects on Existing Authorized Programs

In recent history, the BME department has prioritized admission to the doctoral program over admission to the MSE terminal master's program. The graduate courses offered for both programs are the same and fulfill degree requirements on the program of work for each degree. The BSBME/MSE integrated program will slightly increase enrollment in the biomedical engineering graduate programs and increase the number of terminal MSE degrees

Integrated BSBME/MSE program

awarded. The department is prepared to accommodate the addition of integrated-program students within existing resources. Increases in class size are not expected to require additional sections of courses or faculty.

Expected Enrollment

The BME department intends the integrated program to be suitable for the most talented undergraduates in UT Austin's biomedical engineering program. We anticipate enrollment of less than 10% of each undergraduate cohort, or no more than 15-20 students per year. The number of admits will be coordinated with the number of available seats in BME graduate courses offered. It is expected that the existing courses can accommodate up to 15-20 students from the integrated program per year.

Resources

Courses

No additional sections or courses will be required. Students in the BSBME/MSE integrated program will enroll in existing graduate courses which are already offered on a regular basis. The existing courses have capacity for the additional 15-20 students per year who enter the graduate program through this pathway.

Faculty

No additional faculty will be required. Students in the integrated program will be taught by existing faculty in existing graduate coursework. Students who choose the thesis option will be supervised by existing faculty.

Facilities and Equipment

No additional equipment or laboratories will be required.

Libraries

No additional library resources will be required.

Appendices

Integrated BSBME/MSE program

Appendix A – BSBME Suggested Arrangement of Courses

2018-2020 Catalog

First Year			
First Term	Hours	Second Term	Hours
BIO 311C	3	BME 303	3
BME 303L	3	CH 302	3
UGS 302 or 303	3	CH 204	2
BIO 206L	2	M 408D	4
CH 301	3	PHY 303K	3
M 408C	4	PHY 103M	1
		RHE 306	3
	18		19
Second Year			
First Term	Hours	Second Term	Hours
BME 214L	2	BME 333T	3
CH 320M or 328M	3	BME 313L	3
CH 128K	1	BME 344	3
BME 311	3	BME 335	3
M 427J	4	BCH 369	3
PHY 303L	3		
PHY 103N	1		
	17		15
Third Year			
First Term	Hours	Second Term	Hours
BME 245L	2	BME 261L	2
BME 343	3	BME 355	3
BME 352	3	BME 349	3
BME 365R	3	BME 365S	3
E 316L, 316M, 316N, or 316P	3	Technical area elective	3
Technical area elective	3	BME 353	3
	17		17
Fourth Year			
First Term	Hours	Second Term	Hours
BME 370	3	BME 371	3

Integrated BSBME/MSE program

GOV 310L	3	GOV 312L or 312P	3
Technical area elective	3	Visual and performing arts	3
American history	3	Technical area elective	3
Social and behavioral sciences	3	American history	3
	15		15
Total credit hours: 133			

Integrated BSBME/MSE program

Appendix B – BSBME Suggested Arrangement of Courses for Integrated Program

2018-2020 Catalog

First Year			
First Term	Hours	Second Term	Hours
BIO 311C	3	BME 303	3
BME 303L	3	CH 302	3
UGS 302 or 303	3	CH 204	2
BIO 206L	2	M 408D	4
CH 301	3	PHY 303K	3
M 408C	4	PHY 103M	1
		RHE 306	3
	18		19
Second Year			
First Term	Hours	Second Term	Hours
BME 214L	2	BME 333T	3
CH 320M or 328M	3	BME 313L	3
CH 128K	1	BME 344	3
BME 311	3	BME 335	3
M 427J	4	BCH 369	3
PHY 303L	3		
PHY 103N	1		
	17		15
Third Year			
First Term	Hours	Second Term	Hours
BME 245L	2	BME 261L	2
BME 343	3	BME 355	3
BME 352	3	BME 349	3
BME 365R	3	BME 365S	3
E 316L, 316M, 316N, or 316P	3	Technical area elective	3
Technical area elective	3	BME 353	3
	17		17
Fourth Year: Undergraduate Standing			
First Term	Hours	Second Term	Hours
BME 370	3	BME 371	3

Integrated BSBME/MSE program

GOV 310L	CR*	GOV 312L or 312P	CR*
Technical area elective	3	Visual and performing arts	CR*
American history	CR*	American history	CR*
Social and behavioral sciences	CR*	<i>Graduate coursework</i>	3
<i>Graduate coursework</i>	3	<i>Graduate coursework</i>	3
<i>Graduate coursework</i>	3		
	12		9
Total credit hours toward BSBME: 127			
<i>Total credit hours toward MSE at the end of Y4: 12</i>			
Fifth Year: Graduate Standing			
First Term	Hours	Second Term	Hours
<i>Graduate coursework</i>	3	<i>Graduate coursework</i>	3
<i>Graduate coursework</i>	3	<i>Graduate coursework</i>	3
<i>Graduate coursework</i>	3	<i>Graduate coursework</i>	3
	9		9
<i>Total credit hours toward MSE at the end of Y5: 30</i>			

* As is common among BME undergraduates, it is expected that approximately 15 SCH of coursework required for the BSBME degree plan will be completed through advanced placement credit (CR) for core curriculum and basic science coursework. This will reduce the amount of credit enrolled in the fourth year to accommodate graduate coursework.

Integrated BSBME/MSE program

Appendix C – BSBME Credit Hours by Subject Area

2018-2020 CATALOG BSE DEGREE (ABET CRITERION 5: CURRICULUM)					
Course number: Title	Required, Elective or a Selected Elective by an R, an E or an SE.	Subject Areas in Semester Credit Hours (SCH)			
		Math & Basic Sciences	Engineering Topics	General Education	Other
			<i>*Contains Significant Design</i>		
BME 303L: Introduction to BME Design	R		3		
BME 303: Introduction to Computing	R		3		
BME 214L: Comp Fundamentals of BME Design	R		2*		
BME 311: Network Analysis in BME	R	1	2		
BME 313L: Intro to Numerical Methods in BME	R		3		
BME 333T: Engineering Communication	R			3	
BME 335: Engineering Probability & Statistics	R	2	1		
BME 344: Biomechanics	R		3		
BME 245L: Experimental Principles of BME Design	R		2*		
BME 343: BME Signal & Systems Analysis	R	1	2*		
BME 352: Engineering Biomaterials	R		3		
BME 365R: Quantitative Engineering Physiology I	R	1	2		
BME 261L: Development & Analysis in BME Design	R		2		
BME 349: Biomedical Instrumentation	R		3		
BME 355: Molecular Engineering	R		3		
BME 353: Transport Phenomena in Living Systems	R		3		
BME 365S: Quantitative Engineering Physiology II	R		3		
BME 370: Biomedical Engr. Capstone Design I	R		3*		
BME 371: Biomedical Engr. Capstone Design II	R		3*		

Integrated BSBME/MSE program

<i>Technical Area Elective (no more than 6 Math & Sci; minimum 6 Engr)</i>	SE	6	6		
BIO 311C: Introductory Biology I	R	3			
BIO 206L: Introductory Lab Experiments in Biology	R	2			
CH 301: Principles of Chemistry I	R	3			
CH 302: Principles of Chemistry II	R	3			
CH 204: Introduction to Chemical Practice	R	2			
CH 320M/328M: Organic Chemistry I	R	3			
CH 128K: Laboratory for Organic Chemistry I	R	1			
BCH 369: Fundamentals of Biochemistry	R	3			
M 408C: Differential & Integral Calculus	R	4			
M 408D: Sequences, Series & Multivariable Calculus	R	4			
M 427J: Differential Equations and Linear Algebra	R	4			
PHY 303K: Engineering Physics	R	3			
PHY 103M: Engineering Physics I Laboratory	R	1			
PHY 303L: Engineering Physics II	R	3			
PHY 103N: Engineering Physics II Laboratory	R	1			
UGS 302/303: First-Year Signature Course	R			3	
RHE 306: Rhetoric and Composition	R			3	
American and Texas Government	R			6	
American History	R			6	
Humanities	R			3	
Social and Behavioral Sciences	R			3	
Visual and Performing Arts	R			3	
TOTALS-ABET BASIC-LEVEL REQUIREMENTS		51	52	30	<i>N/A</i>

Integrated BSBME/MSE program

OVERALL TOTAL CREDIT HOURS FOR COMPLETION OF THE PROGRAM	133				
PERCENT OF TOTAL					
Total must satisfy either credit hours or percentage	<i>Minimum Semester Credit Hours</i>	32	48	N/A	N/A
	Minimum Percentage	159%	108%		

Integrated BSBME/MSE program

Appendix D – BSBME Credit Hours by Subject Area for Integrated Program

2018-2020 CATALOG BSE DEGREE (ABET CRITERION 5: CURRICULUM)					
Course number: Title	Required, Elective or a Selected Elective by an R, an E or an SE.	Subject Areas in Semester Credit Hours (SCH)			
		Math & Basic Sciences	Engineering Topics <i>*Contains Significant Design</i>	General Education	Other
BME 303L: Introduction to BME Design	R		3		
BME 303: Introduction to Computing	R		3		
BME 214L: Comp Fundamentals of BME Design	R		2*		
BME 311: Network Analysis in BME	R	1	2		
BME 313L: Intro to Numerical Methods in BME	R		3		
BME 333T: Engineering Communication	R			3	
BME 335: Engineering Probability & Statistics	R	2	1		
BME 344: Biomechanics	R		3		
BME 245L: Experimental Principles of BME Design	R		2*		
BME 343: BME Signal & Systems Analysis	R	1	2*		
BME 352: Engineering Biomaterials	R		3		
BME 365R: Quantitative Engineering Physiology I	R	1	2		
BME 261L: Development & Analysis in BME Design	R		2		
BME 349: Biomedical Instrumentation	R		3		
BME 355: Molecular Engineering	R		3		
BME 353: Transport Phenomena in Living Systems	R		3		
BME 365S: Quantitative Engineering Physiology II	R		3		
BME 370: Biomedical Engr. Capstone Design I	R		3*		
BME 371: Biomedical Engr. Capstone Design II	R		3*		

Integrated BSBME/MSE program

<i>Technical Area Elective (Engr only)</i>	<i>SE</i>	<i>0</i>	<i>6</i>		
BIO 311C: Introductory Biology I	R	3			
BIO 206L: Introductory Lab Experiments in Biology	R	2			
CH 301: Principles of Chemistry I	R	3			
CH 302: Principles of Chemistry II	R	3			
CH 204: Introduction to Chemical Practice	R	2			
CH 320M/328M: Organic Chemistry I	R	3			
CH 128K: Laboratory for Organic Chemistry I	R	1			
BCH 369: Fundamentals of Biochemistry	R	3			
M 408C: Differential & Integral Calculus	R	4			
M 408D: Sequences, Series & Multivariable Calculus	R	4			
M 427J: Differential Equations and Linear Algebra	R	4			
PHY 303K: Engineering Physics	R	3			
PHY 103M: Engineering Physics I Laboratory	R	1			
PHY 303L: Engineering Physics II	R	3			
PHY 103N: Engineering Physics II Laboratory	R	1			
UGS 302/303: First-Year Signature Course	R			3	
RHE 306: Rhetoric and Composition	R			3	
American and Texas Government	R			6	
American History	R			6	
Humanities	R			3	
Social and Behavioral Sciences	R			3	
Visual and Performing Arts	R			3	
TOTALS-ABET BASIC-LEVEL REQUIREMENTS		45	52	30	<i>N/A</i>

Integrated BSBME/MSE program

OVERALL TOTAL CREDIT HOURS FOR COMPLETION OF THE PROGRAM	127				
PERCENT OF TOTAL					
Total must satisfy either credit hours or percentage	<i>Minimum Semester Credit Hours</i>	32	48	<i>N/A</i>	<i>N/A</i>
	Minimum Percentage	141%	108%		

Integrated BSBME/MSE program

Appendix E – MSE Program of Work (Coursework)

This Program of Work meets the Coursework Master’s Degree requirements for students who entered the MSE program Fall 2017 to Summer 2019. Email your completed form in PDF format to the BME Graduate Coordinator or drop off a hard copy to BME 3.308 AF.

Name: _____ UT EID: _____

Date: _____ First Semester Enrolled at UT Austin: _____

Enter information for required coursework completed, in progress, and planned. Only two CR/NC graduate level courses or two upper division courses taken for a letter grade may count towards the “Other Technical Course” requirement. All other courses must be graduate-level and taken for a letter grade. Students must take one course from three of the four technical areas.

Required Coursework: 30 Hours							
Requirement	Dept	No	Title	Unique	Sem	Yr	Grade
Biological or Clinical Sciences							
Basic or Applied Math/Stats/Other							
Technical Area 1							
Technical Area 2							
Technical Area 3							
Technical Area 4							
Other Technical Course							
Other Technical Course							
Other Technical Course							
Other Technical Course							
Other Technical Course							

Expected Date of Graduation: Fall Spring Summer Year: _____

Graduate Advisor Signature: _____ Date: _____

Integrated BSBME/MSE program

Appendix F – MSE Program of Work (Thesis)

This Program of Work meets the Thesis Master’s Degree requirements for students who entered the MSE program Fall 2017 to Summer 2019. Email your completed form in PDF format to the BME Graduate Coordinator or drop off a hard copy to BME 3.308 AF.

Name: _____ UT EID: _____

Date: _____ First Semester Enrolled at UT Austin: _____

Enter information for required coursework completed, in progress, and planned. Only two CR/NC graduate level courses or two upper division courses taken for a letter grade may count towards the “Other Technical Course” requirement. All other courses must be graduate-level and taken for a letter grade. Students must take one course from three of the four technical areas.

Required Coursework: 24 Hours							
Requirement	Dept	No	Title	Unique	Sem	Yr	Grade
Biological or Clinical Sciences							
Basic or Applied Math/Stats/Other							
Technical Area 1							
Technical Area 2							
Technical Area 3							
Technical Area 4							
Other Technical Course							
Other Technical Course							
Other Technical Course							
Required Thesis: 6 hours	BME	698A					
	BME	698B					

Expected Date of Graduation: Fall Spring Summer **Year:** _____

Graduate Advisor Signature: _____ Date: _____

¹ See <https://facultycouncil.utexas.edu/degree-program-changes> for detailed explanations.

² Submit required Texas Higher Education Coordinating Board forms to the provost’s office (lydia.cornell@austin.utexas.edu); downloadable from URL <https://facultycouncil.utexas.edu/thecc-forms>

³ **EXCLUSIVE:** of exclusive application and of primary interest only to a single college or school (“no protest” period is seven calendar days); **GENERAL:** of general interest to more than one college or school (but not for submission to the General Faculty) (“no protest” period is fourteen calendar days); major legislation must be submitted to the General Faculty for adoption (“no protest” period is fourteen calendar days).

⁴ The proposed text should be based on the text of the current catalog available at: <http://catalog.utexas.edu/undergraduate/>

Integrated BSBME/MSE program

Strike through and replace (with underlines) only the specific language to be changed. Do NOT use track changes, and do not include hyperlinks in the catalog copy. Submit form electronically to the Office of the General Faculty and Faculty Council at fc@austin.utexas.edu. For questions on completing this section, please contact Victoria Cervantes, vc@austin.utexas.edu, 471-5934 or Brenda Schumann, brenda.schumann@austin.utexas.edu, 475-7654.