



IUPUI

DEPARTMENT OF BIOMEDICAL ENGINEERING

BME 5-Year BS/MS Handbook

Bachelor of Science Degree in Biomedical Engineering
Master of Science Degree in Biomedical Engineering

Last Revision 8 January, 2021

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5-year MS/BS BME Handbook Edits

January 2020 (Approved by BME Faculty on 04/03/20)

1. Added BS/MS plans of study that reflect BS BME curriculum changes (Requirement term 4188 plan of study for BS BME)
2. Updated Graduate Plan of Study form
3. Added application timeline chart

January 2021 (Approved by BME Faculty on 01/08/2021)

1. Added additional MS Handbook language
2. Added Graduation Application and Degree Conferral headed section
3. Removed STAT 51100 as an overlap course
4. *Grade Requirements, Advisory Committee, and Progress Review* section updated to match updates to the MS BME Handbook
5. Updated DOI and PoS MS BME forms

Application and Entry to BME 5-Year BS/MS Program

The BME 5-Year BS/MS Program provides academically successful students the opportunity to earn both a Bachelor's and (non-thesis) Master's degree in a total of five years. (A thesis option is also available, but may require more time to complete depending on research progress.) To be eligible for this combined-degree program, students must maintain a program GPA of at least 3.2 for the first 85 credit hours of coursework that apply towards the BSBME plan of study (PoS). For BME students following the standard undergraduate plan, those 85 credit hours will be completed by the end of the first semester of the junior year.

To apply for the combined degree program, interested students should submit the Declaration of Intent to Pursue the Combined Degree no later than **February 15th** of the spring term immediately preceding their initial enrollment in BME 49101 (first semester senior design) in the fall. Notification of preliminary admission to the combined-degree program will be made no later than **March 15th** of the term of application. Full admission to the MSBME program is contingent upon successful completion of the BSBME program and meeting minimum grade and GPA requirements as described below.

Transitional Admission Period: Contingent period of the combined-degree program

The period between preliminary admission to the combined program and full admission to the MSBME program is a transitional period in which the student is jointly and contingently enrolled in both the BSBME and MSBME programs. Students must develop and file Plans of Study (PoS) for their BSBME degree and MSBME degree. They must take coursework that will be used to complete their BSBME PoS, including the 9 credit hours of overlapping 500 level graduate courses. They must form their Graduate Advisory Committee and prepare their applications for full admission into the MSBME program. Students must maintain a minimum program GPA of 3.2 on the cumulative GPA of coursework that applies towards the PoS for the BSBME degree and maintain a B or better on all courses to be transferred to the MSBME degree PoS. Failure to maintain these standards can result in the dismissal of the student from the combined-degree program (see below). These requirements are more stringent than the current admission requirements for the MSBME program.

Conversion to full admission to the MS BME program

Students must submit an application for admission to the Graduate MSBME Program no later than the final semester of the student's BSBME program. The full admission to the graduate program will not be made unless the student meets the minimum program 3.2 GPA requirement and receives at least a B grade in each of the three overlapping graduate courses in his/her BSBME plan of study. Admission to the MSBME program will convert the preliminary admission to full admission to the MSBME program.

The total credit hours required for this BSBME/MSBME combined-degree program will be 151 credit hours. For reference, the BSBME requires 130 credit hours and the MS in BME requires 30 credit hours, for a total of 160 credit hours. The accelerated program is designed to allow the application of an overlapping 9 credit hours to both the BSBME and MSBME plans of study, thereby reducing the number of required hours to 151 credit hours. A further 3 credit hours of graduate level courses, taken as an undergraduate prior to admission to the MSBME program but not applied to the BSBME PoS can be transferred and applied to satisfy 30 credit hours of the MSBME PoS, if appropriate. Of these overlapping and transfer courses, IUPUI BME courses can be designated on the MSBME PoS as a "primary" or as a "related field" course, as described in the *BME MS Graduate Handbook*.

The GRE and application fee requirements of the application packet to the MSBME program will be waived. However, students will be strongly encouraged to take the GRE, and to submit the graduate application no later than December of the transition year, to maintain eligibility for graduate scholarships.

Once admitted into the MS BME program, students must refer to the *BME MS Graduate Handbook* for further guidelines, and comply with degree requirements outlined in the *BME MS Graduate Handbook* during their fifth year of the combined-degree program.

Continued Eligibility in the BME Graduate Program

Once admitted into the MS BME program, the rules of admission and program administration are governed under the department’s academic policies and procedures of the MSBME program. Upon full admission to the MSBME program, a minimum program GPA of 3.00 will be required in the student's MSBME plan of study for graduation as in the traditional Master’s program. Master’s GPA will be calculated by including the grades of the three overlapping graduate courses transferred from the BS plan of study.

Graduation Application and Degree Conferral

The student is responsible for completing a graduation application (by the deadlines set within the Purdue School of Engineering & Technology) for each degree awarded. The BSBME degree will be awarded upon the successful completion of the BSBME plan of study. Upon successful completion of the combined-degree program (i.e. 151 credit hours, successful submission of all administrative forms, and successful thesis defense, if applicable) the student will be eligible for the MSBME degree. Students should note that neither degree will be automatically awarded.

Courses Required for Graduation

Students in the combined-degree program must complete all the requirements of both the BSBME degree (described in the *BME Undergraduate Handbook*) and the MSBME degree (described in the *BME MS Graduate Handbook*). However, to reduce the time to graduation, 9 overlapping credit hours (3 courses) will be selected to satisfy both undergraduate (depth area) and graduate program requirements. To satisfy depth area requirements, **at least two courses** (6 credit hours) applied to the depth area must be engineering courses; the other two can be other engineering or appropriate math or science courses. To satisfy graduate requirements, these nine overlapping credit hours combined with the 21 credit hours in the post-baccalaureate year must include the following:

| MS Plan of Study Courses | Credit Hours | |
|--|--------------|--------|
| | Non-Thesis | Thesis |
| Approved graduate MATH or STAT course | 3 | 3 |
| Graduate Biomedical Engineering courses | 12 | 6-12 |
| Approved Graduate Life Science or Engineering elective courses | 0-6 | 6 |
| Approved graduate Engineering courses | 9-15 | 0-6 |
| Thesis research | 0 | 9 |
| Total | 30 | 30 |

Students should work closely with their undergraduate BME advisor (BSBME) and BME Faculty Graduate Advisor (MSBME) to select courses appropriate to their undergraduate depth area and their graduate education goals for the three overlapping courses in the combined-degree program. Examples of possible overlapping courses, taken during the transition year, are listed below by depth area. However, other 500-level math, science, or engineering courses not included here but suggested by the student’s advisors might also be appropriate. Once a student is fully admitted as a graduate student in the MSBME program, consult with the BME Faculty Graduate Advisor to prepare your Purdue graduate MS PoS using the draft PoS prepared earlier.

Biomaterials/Tissue Engineering

BME 59500 Polymers for Biomedical Applications OR BME 58200 Advanced Biomedical Polymers
BME 57100 Drug Delivery
BME 59500 Engineering Principles of Biomolecular Interaction
BME 59500 Biomolecular Engineering
BME 59500 Engineering Analysis of Tissues
BIOL 56100 Immunology
BIOL 56800 Regenerative Biology & Medicine
BIOL 57310 Stem Cell Biology
BIOL 50700 Principles of Molecular Biology
CHEM 53300 Intro to Biochemistry

Biomechanics

BME 57100 Drug Delivery OR BME 59500 Engineering Principles of Biotechnology
BME 59500 Biomolecular Engineering OR BME 59500 Molecular and Cellular Mechanics
BME 59500 Vascular Biomechanics OR BME 59500 Cellular Mechanotransduction
BME 54400 Musculoskeletal Biology and Mechanics OR BME 59500 Engineering Analysis of Tissues
ME 54600 CAD/CAM Theory and Advanced Applications
BME 59500/ME 59700 Orthopedic Biomechanics

Bioinstrumentation/Neural Engineering/Biosignal Processing

BME 59500 Cardiac Electrophysiology
BME 52700 Implantable Systems OR BME 59500 Cellular Electrophysiology
BME 59500 Neural Engineering OR BME 59500 Embedded Bioinstrumentation
BME 59500 Engineering Principles of Biotechnology
MATH 52500 Intro to Complex Analysis

Appropriate for any Depth Area

BME 59500 Experimental Methods in BME
BIOL 55600 Physiology I OR PHSL-F 503 Human Physiology
MATH 51000 Vector Calculus
MATH 51100 Linear Algebra w/Applications
MATH 53700 Applied Math Scientists/Engr I
MATH 55200 Applied Numerical Methods II
STAT 51200 Applied Regression Analysis
STAT 52300 Categorical Data Analysis
STAT 52800 Intro to Mathematical Statistics

Grade Requirements, Advisory Committee, and Progress Review

Upon preliminary acceptance to the combined-degree program, the student will enter a 1-year Transitional Admission period where he/she completes the requirements of the BSBME degree, including the three overlapping graduate level courses and maintains the minimum academic performance requirements. During the transition year, students must continue to maintain a BSBME program GPA of at least 3.2. Furthermore, students must earn grades of at least B in the three overlapping 500-level courses that will apply to the MSBME plan of study. Upon full admission to the MS BME program, a minimum GPA of 3.00 will be required in the student's MS BME PoS as described in the *BME MS Graduate Handbook*. Master's GPA will be calculated by including the grades of the three overlapping graduate courses transferred from the BS plan of study.

BME 69600 or BME 69700 is **not required** for students in the BME 5-Year BS/MS Combined Degree Program only. They are still highly recommended for interested students. For more information, consult the *BME MS Graduate Handbook*.

Students in the 5-year combined degree program should continue to consult with their undergraduate advisor to ensure all requirements for their BS degree program are met. Once students are admitted into the MS BME program, they will be assigned a BME Faculty Graduate Advisor to advise students on requirements related to the MS BME degree.

The combined degree program offers Thesis and Non-Thesis options. There are three general pathways through the BME Master’s program: (A) Non-Thesis with course only, (B) Non-Thesis with a project and (C) Thesis. Both options A and B can be completed in 5 years, with possible summer research. However, Thesis option may require more than 5 years to complete (one or more semesters including summer research) depending on scheduling and research progress.

For Non-Thesis students in the 5-year combined degree program, the BME Director of the Graduate Program will serve as their BME Faculty Graduate Advisor.

For Thesis MS students, their BME Faculty Graduate Advisor is the faculty member sponsoring the MS thesis research project. Student planning to pursue the thesis-based MS degree must work closely with their advisor to plan their program. Depending on the research project, it may take longer than 5 years for Thesis students to complete the BS/MS combined-degree program. The BME Faculty Graduate Advisor and student must establish a Graduate Advisory Committee. It is the responsibility of this committee to assist the student in finalizing the MS PoS, meeting degree requirements, and conducts all necessary examinations related to the MS Thesis research project.

Students must maintain academic performance and progress to meet the admission requirements of 3.2 GPA and a grade of at least a B in the 500-level coursework to be allowed to continue in the combined-degree program. If a student earns less than a B grade in any 500-level course, the student must bring this to the attention of their undergraduate advisor. The Graduate Advisory Committee will then be asked to evaluate each student’s progress on a case-by-case basis and recommend action. Possible recommendations include but are not limited to exclusion of a class from the Master’s plan of study, the retaking of a class, or dismissal from the program.

Important Deadlines for 5-year MS/BS BME Combined Degree

Important dates for students interested in pursuing a 5-year MS/BS BME Combined Degree are below. Dates in the table area for students who complete a BSBME degree in four years. Transfer students and/or students on an accelerated plan of study should note that these dates and deadlines may be altered.

| 5-YEAR MS/BS COMBINED DEGREE ITEM | FORM REQUIRED | LOCATION TO TURN IN FORM | TYPICAL DEADLINE |
|--|---------------------------|----------------------------------|---|
| Declaration of Intent (DOI) Form | Yes | BME Department or BS BME Advisor | February 15 during the junior year (BS BME) |
| <i>You will receive notification of a DOI decision from the BME Undergraduate Committee by March 15</i> | | | |
| Tentative Plan of Study Form | Yes | BS BME Advisor | First week of classes of your senior year (BS BME) |
| Apply to Purdue University Graduate School | Online Application System | Online | November 1 of your senior year (BS BME) |
| <i>You will receive notification of MS BME application decision from the Purdue Graduate School and BME Graduate Program Director</i> | | | |
| Plan of Study Schedule | Online | Online | Discuss with BME Faculty Graduate Advisor |



IUPUI

DEPARTMENT OF BIOMEDICAL ENGINEERING
Master of Science Degree in Biomedical Engineering (MS BME)

Tentative PLAN OF STUDY for 5-year BS/MS BME Students

All 5-year MS/BS BME students who have submitted a Declaration of Intent Form to the BME Undergraduate Committee should fill out this form by the first week of classes of your senior year.

Name: _____ ID Number: _____

Admission Date: _____ Anticipated Graduation: _____

Area of Concentration (Biomechanics, Biomaterials, Bioinstrument/Neuro): _____

9-CREDITS OF 500-LEVEL OR HIGHER OVERLAP COURSES (BS AND MS)

| Primary /Elective | Course # (ex:BME595) | Course Title | Semester Taken | Credit Hours | Grade (if known) |
|-------------------|----------------------|--------------|----------------|--------------|------------------|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Total Credit Hours: _____

SEMESTER 1 (MS BME)

| Primary /Elective | Course # (ex:BME595) | Course Title | Credit Hours | Grade (if known) |
|-------------------|----------------------|--------------|--------------|------------------|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Total Credit Hours: _____

SEMESTER 2 (MS BME)

| Primary /Elective | Course # (ex:BME595) | Course Title | Credit Hours | Grade (if known) |
|-------------------|----------------------|--------------|--------------|------------------|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Total Credit Hours: _____

SEMESTER 3 (MS BME, IF NEEDED)

| Primary /Elective | Course # (ex:BME595) | Course Title | Credit Hours | Grade (if known) |
|-------------------|----------------------|--------------|--------------|------------------|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Total Credit Hour: _____

Fill out only the table below with that is applicable to your MS BME degree.

SUMMARY – NON-THESIS MS BME REQUIREMENTS

| | Required | Course # | Credit Hours |
|---------------------------------|----------|----------|--------------|
| Mathematics or Statistic Course | 3 | | |
| BME Courses | 12 | | |
| Life Science or Eng Elective | 0 – 6 | | |
| Engineering Elective | 9-15 | | |

Total: 30 Total Credit Hour: _____

SUMMARY – THESIS MS BME REQUIREMENTS

| | Required | Course # | Credit Hours |
|---------------------------------|----------|----------|--------------|
| Mathematics or Statistic Course | 3 | | |
| BME Courses | 6-12 | | |
| Life Science or Eng Elective | 0 – 6 | | |
| Engineering Elective | 6 | | |
| Thesis Research | 9 | | |

Total: 30 Total Credit Hour: _____

Thesis students: discuss Committee members with your Faculty Advisor prior to listing the members below. Do not contact your committee members until you begin your MS BME coursework.

Return to: Department of Biomedical Engineering, SL 220

MS BME ADVISORY COMMITTEE MEMBERS

- (1 - Chair) _____ (Non-Thesis: Dr. Ji; Thesis: MS Advisor)
- (2) _____ (Thesis only)
- (3) _____ (Thesis only)

Biomedical Engineering BS/MS Non-Thesis Option (enter BS BME before 2018)

First Year

| <i>First Semester</i> | SCH | <i>Second Semester</i> | SCH |
|--|-----------|---|-----------|
| Biol. K101 Concepts of Biology I | 5 | Chem. C105 Principles of Chemistry I | 3 |
| ENGR 19500 Engineering Seminar | 1 | Chem. 125 Experimental Chem. I | 2 |
| ENGR 19600 Engineering Problem Solving | 3 | Phys 15200 Mechanics | 4 |
| Math 16500 Integrated Calculus & Analytic Geometry | 4 | ENGR 29700 Intro. to Computing (MATLAB) | 1 |
| Eng W 131 Elementary Composition I | 3 | Math 16600 Integrated Calculus and Analytic Geometry II | 4 |
| ENGR 19700 Intro. to Computing (C prog.) | 2 | Math 17100 Multidimensional Mathematics | 3 |
| TOTAL SCH | 18 | | 17 |

Second Year

| <i>First Semester</i> | SCH | <i>Second Semester</i> | SCH |
|---------------------------------------|-----------|---|-----------|
| Math 26100 Multivariate Calculus | 4 | Math 26600 Differential Eqns. | 3 |
| Phys 25100 Elec., Heat, Optics | 5 | Biol. K324 Cell Biology | 3 |
| BME 24100 Intro. Biomechanics | 4 | Biol. K325 Cell Biology Lab | 2 |
| Chem. C106 Principles of Chemistry II | 3 | BME 22200 Biomeasurements | 4 |
| | | Comm. R110 Fund of Speech Communication | 3 |
| | | General Education Elective | 3 |
| TOTAL SCH | 16 | | 18 |

Third Year

| <i>First Semester</i> | SCH | <i>Second Semester</i> | SCH |
|---|-----------|--|-----------|
| Chem. C341 Organic Chemistry I | 3 | BME 32200 Probability & Applications for BME | 3 |
| Chem. C343 Organic Chemistry Lab I | 2 | BME 35200 Tissue Behavior and Properties | 3 |
| BME 38100 Implantable Materials & Biological Response | 3 | BME 35400 Problems in Tissue Behavior and Properties | 1 |
| BME 38300 Problems in Implantable Materials & Biological Response | 1 | BME Gateway Elective* | 3 |
| BME 33100 Biosignals and Systems | 3 | General Education Elective | 3 |
| BME 33400 Biomedical Computing | 3 | BME 40200 BME Seminar | 1 |
| General Education Elective | 3 | TCM 36000 Communications in Eng Practice | 2 |
| TOTAL SCH | 18 | | 16 |

Fourth Year

| <i>First Semester</i> | SCH | <i>Second Semester</i> | SCH |
|--|-----------|--|-----------|
| BME 49100 Biomedical Engineering Design I | 3 | BME 49200 Biomedical Engineering Design II | 3 |
| BME 41100 Quantitative Physiology | 3 | BME 46100 Transport Processes in BME | 3 |
| BME 44200 Biofluid Mechanics | 3 | BME 5XX00 or other approved grad Elective* | 3 |
| BME 5XX00 or other grad Engr Elective* | 3 | General Education Elective | 3 |
| BME 5XX00 or other approved grad Elective* | 3 | | |
| TOTAL SCH | 15 | | 12 |

* The four BME electives must be selected in consultation with an advisor to form an appropriate Depth Area.

Fifth Year

| <i>First Semester</i> | SCH | <i>Second Semester</i> | SCH |
|---|-----------|---|----------|
| Approved graduate MATH or STAT (if not taken during 4 th Year) or BME 59500 or 69500 | 3 | Approved graduate life-science (if not taken during Fourth Year) or engineering | 3 |
| BME 59500 or 69500 | 3 | Approved graduate engineering | 3 |
| Approved graduate life-science (if not taken during Fourth Year) or engineering | 3 | Approved graduate engineering | 3 |
| Approved graduate engineering | 3 | | |
| TOTAL SCH | 12 | | 9 |

Rev. 01/26/17

TOTAL SCH = 151

Notes: A student who is on-track to complete all BS requirements by the end of the 8th semester may take one of the fifth-year graduate courses during the 2nd semester of the 4th year

Biomedical Engineering BS/MS Thesis Option (enter BS BME, before 2018)

First Year

| <i>First Semester</i> | SCH | <i>Second Semester</i> | SCH |
|--|-----------|---|-----------|
| Biol. K101 Concepts of Biology I | 5 | Chem. C105 Principles of Chemistry I | 3 |
| ENGR 19500 Engineering Seminar | 1 | Chem. 125 Experimental Chem. I | 2 |
| ENGR 19600 Engineering Problem Solving | 3 | Phys 15200 Mechanics | 4 |
| Math 16500 Integrated Calculus and Analytic Geometry | 4 | ENGR 29700 Intro. to Computing (MATLAB) | 1 |
| Eng W 131 Elementary Composition I | 3 | Math 16600 Integrated Calculus and Analytic Geometry II | 4 |
| ENGR 19700 Intro. to Computing (C prog.) | 2 | Math 17100 Multidimensional Mathematics | 3 |
| TOTAL SCH | 18 | | 17 |

Second Year

| <i>First Semester</i> | SCH | <i>Second Semester</i> | SCH |
|---------------------------------------|-----------|---|-----------|
| Math 26100 Multivariate Calculus | 4 | Math 26600 Differential Eqns. | 3 |
| Phys 25100 Elec., Heat, Optics | 5 | Biol. K324 Cell Biology | 3 |
| BME 24100 Intro. Biomechanics | 4 | Biol. K325 Cell Biology Lab | 2 |
| Chem. C106 Principles of Chemistry II | 3 | BME 22200 Biomeasurements | 4 |
| | | Comm. R110 Fundamentals of Speech Communication | 3 |
| | | General Education Elective | 3 |
| TOTAL SCH | 16 | | 18 |

Third Year

| <i>First Semester</i> | SCH | <i>Second Semester</i> | SCH |
|---|-----------|--|-----------|
| Chem. C341 Organic Chemistry I | 3 | BME 32200 Probability & Applications for BME | 3 |
| Chem. C343 Organic Chemistry Lab I | 2 | BME 35200 Tissue Behavior and Properties | 3 |
| BME 38100 Implantable Materials & Biological Response | 3 | BME 35400 Problems in Tissue Behavior and Properties | 1 |
| BME 38300 Problems in Implantable Materials & Biological Response | 1 | BME Gateway Elective* | 3 |
| BME 33100 Biosignals and Systems | 3 | General Education Elective | 3 |
| BME 33400 Biomedical Computing | 3 | BME 40200 BME Seminar | 1 |
| General Education Elective | 3 | TCM 36000 Communications in Engineering Practice | 2 |
| TOTAL SCH | 18 | | 16 |

Fourth Year

| <i>First Semester</i> | SCH | <i>Second Semester</i> | SCH |
|---|-----------|--|-----------|
| BME 49100 Biomedical Engineering Design I | 3 | BME 49200 Biomedical Engineering Design II | 3 |
| BME 41100 Quantitative Physiology | 3 | BME 46100 Transport Processes in BME | 3 |
| BME 44200 Biofluid Mechanics | 3 | BME 5XX00 or other approved grad Elective* | 3 |
| BME 5XX00 or other grad Engr Elective* | 3 | General Education Elective | 3 |
| BME 5XX00 other approved grad Elective* | 3 | | |
| TOTAL SCH | 15 | | 12 |

* The four BME electives must be selected in consultation with an advisor to form an appropriate Depth Area.

Summer after Fourth Year

| <i>Summer Session</i> | SCH |
|-----------------------|------------|
| BME 69800 | 2-3 |
| TOTAL SCH | 2-3 |

Fifth Year

| <i>First Semester</i> | SCH | <i>Second Semester</i> | SCH |
|--|------------|---|------------|
| Approved graduate MATH or STAT (if not taken during Fourth Year) or BME 59500 or 69500 | 3 | Approved graduate life-science (if not taken during Fourth Year) or engineering | 3 |
| BME 59500 or 69500 | 3 | Approved graduate life-science (if not taken during Fourth Year) or engineering | 3 |
| BME 69800 | 2-3 | BME 69800 | 2-3 |
| TOTAL SCH | 8-9 | | 8-9 |

Summer after Fifth Year

| <i>Summer Session</i> | SCH |
|-----------------------|------------|
| BME 69800 | 0-3 |
| TOTAL SCH | 0-3 |

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TOTAL SCH = 151

Notes: Additional time beyond the fifth year may be required to complete the thesis. Thesis students should work with their advisors on how best to manage research progress and enrollment in BME 69800 thesis research credits.

A student who is on-track to complete all BS requirements by the end of the 8th semester may take one of the fifth-year graduate courses during the 2nd semester of the 4th year.

Biomedical Engineering BS/MS Non-Thesis Option (enter BS BME 2018 or after)

First Year

| <i>First Semester</i> | SCH | <i>Second Semester</i> | SCH |
|---|-----------|---|-----------|
| BIOL-K101 Concepts of Biology I | 5 | CHEM-C 105 Principles of Chemistry I | 3 |
| ENGR 12500 First-Year Seminar for Eng. | 1 | CHEM-C 125 Experimental Chem. I | 2 |
| ENGR 19600 Introduction to Engineering | 3 | PHYS 15200 Mechanics | 4 |
| MATH 16500 Analytic Geometry & Calculus | 4 | ENGR 29700 Intro. to Computing (MATLAB) | 1 |
| ENG-W 131 Reading, Writing, and Inquiry I | 3 | MATH 16600 Analytic Geometry & Calculus | 4 |
| ENGR 19700 Intro. to Computing (C prog.) | 2 | MATH 17100 Multidimensional Mathematics | 3 |
| TOTAL SCH | 18 | | 17 |

Second Year

| <i>First Semester</i> | SCH | <i>Second Semester</i> | SCH |
|--|-----------|--|-----------|
| MATH 26100 Multivariate Calculus | 4 | MATH 26600 Differential Equations | 3 |
| PHYS 25100 Electricity, Heat, and Optics | 5 | BIOL-K 324 Cell Biology | 3 |
| BME 24101 Introductory Biomechanics | 4 | BME 22201 Introductory Biomeasurements | 3 |
| BME 24300 Biomechanics Lab | 1 | BME 22400 Biomeasurements Lab | 1 |
| TCM 21800 Intro to Eng Technical Reports | 1 | COMM-R 110 Fundamentals of Speech | 3 |
| Chem. C106 Principles of Chemistry II | 3 | General Education Elective | 3 |
| TOTAL SCH | 17 | | 16 |

Third Year

| <i>First Semester</i> | SCH | <i>Second Semester</i> | SCH |
|---|-----------|---|-----------|
| BME 33100 Biosignals and Systems | 3 | BME 32200 Probability & Statistics in BME | 3 |
| BME 33400 Biomedical Computing | 3 | BME 35200 Cell and Tissue Mechanics | 3 |
| BME 38100 Implantable Materials & Biol Resp | 3 | BME 35400 Cell and Tissue Lab | 1 |
| BME 38300 Implantable Materials Lab | 1 | BME 30200 Prof Develop & Design in BME | 2 |
| TCM 35900 Tech Data Reporting | 1 | BME 38800 Applied Biomaterials | 3 |
| CHEM-C 341 Organic Chemistry I | 3 | BME 44200 Biofluid Mechanics | 3 |
| General Education Elective | 3 | | |
| TOTAL SCH | 17 | | 15 |

Fourth Year

| <i>First Semester</i> | SCH | <i>Second Semester</i> | SCH |
|--|-----------|--|-----------|
| BME 49101 Biomedical Engineering Design | 2 | BME 49200 Biomedical Engineering Design II | 3 |
| BME 41101 Quantitative Physiology | 4 | BME/Eng Elective* | 3 |
| BME 46100 Transport Processes in BME | 3 | BME 5XX00 or other approved grad Elective* | 3 |
| BME 5XX00 or other grad Engr Elective* | 3 | General Education Elective | 3 |
| BME 5XX00 or other approved grad Elective* | 3 | General Education Elective | 3 |
| TOTAL SCH | 15 | | 12 |

* The four BME electives must be selected in consultation with an advisor to form an appropriate Depth Area.

Fifth Year

| <i>First Semester</i> | SCH | <i>Second Semester</i> | SCH |
|---|-----------|---|----------|
| Approved graduate MATH or STAT (if not taken during 4 th Year) or BME 59500 or 69500 | 3 | Approved graduate life-science (if not taken during Fourth Year) or engineering | 3 |
| BME 59500 or 69500 | 3 | Approved graduate engineering | 3 |
| Approved graduate life-science (if not taken during Fourth Year) or engineering | 3 | Approved graduate engineering | 3 |
| Approved graduate engineering | 3 | | |
| TOTAL SCH | 12 | | 9 |

Rev. 11/22/19

TOTAL SCH = 151

Notes: A student who is on-track to complete all BS requirements by the end of the 8th semester may take one of the fifth-year graduate courses during the 2nd semester of the 4th year

Biomedical Engineering BS/MS Thesis Option (enter BS BME 2018 or after)

First Year

| <i>First Semester</i> | SCH | <i>Second Semester</i> | SCH |
|---|-----------|---|-----------|
| BIOL-K101 Concepts of Biology I | 5 | CHEM-C 105 Principles of Chemistry I | 3 |
| ENGR 12500 First-Year Seminar for Eng. | 1 | CHEM-C 125 Experimental Chem. I | 2 |
| ENGR 19600 Introduction to Engineering | 3 | PHYS 15200 Mechanics | 4 |
| MATH 16500 Analytic Geometry & Calculus | 4 | ENGR 29700 Intro. to Computing (MATLAB) | 1 |
| ENG-W 131 Reading, Writing, and Inquiry I | 3 | MATH 16600 Analytic Geometry & Calculus | 4 |
| ENGR 19700 Intro. to Computing (C prog.) | 2 | MATH 17100 Multidimensional Mathematics | 3 |
| TOTAL SCH | 18 | | 17 |

Second Year

| <i>First Semester</i> | SCH | <i>Second Semester</i> | SCH |
|--|-----------|--|-----------|
| MATH 26100 Multivariate Calculus | 4 | MATH 26600 Differential Equations | 3 |
| PHYS 25100 Electricity, Heat, and Optics | 5 | BIOL-K 324 Cell Biology | 3 |
| BME 24101 Introductory Biomechanics | 4 | BME 22201 Introductory Biomeasurements | 3 |
| BME 24300 Biomechanics Lab | 1 | BME 22400 Biomeasurements Lab | 1 |
| TCM 21800 Intro to Eng Technical Reports | 1 | COMM-R 110 Fundamentals of Speech | 3 |
| Chem. C106 Principles of Chemistry II | 3 | General Education Elective | 3 |
| TOTAL SCH | 17 | | 16 |

Third Year

| <i>First Semester</i> | SC H | <i>Second Semester</i> | SCH |
|---|-----------|---|-----------|
| BME 33100 Biosignals and Systems | 3 | BME 32200 Probability & Statistics in BME | 3 |
| BME 33400 Biomedical Computing | 3 | BME 35200 Cell and Tissue Mechanics | 3 |
| BME 38100 Implantable Materials & Biol Resp | 3 | BME 35400 Cell and Tissue Lab | 1 |
| BME 38300 Implantable Materials Lab | 1 | BME 30200 Prof Develop & Design in BME | 2 |
| TCM 35900 Tech Data Reporting | 1 | BME 38800 Applied Biomaterials | 3 |
| CHEM-C 341 Organic Chemistry I | 3 | BME 44200 Biofluid Mechanics | 3 |
| General Education Elective | 3 | | |
| TOTAL SCH | 17 | | 15 |

Fourth Year

| <i>First Semester</i> | SCH | <i>Second Semester</i> | SCH |
|--|-----------|--|-----------|
| BME 49101 Biomedical Engineering Design | 2 | BME 49200 Biomedical Engineering Design II | 3 |
| BME 41101 Quantitative Physiology | 4 | BME/Eng Elective* | 3 |
| BME 46100 Transport Processes in BME | 3 | BME 5XX00 or other approved grad Elective* | 3 |
| BME 5XX00 or other grad Engr Elective* | 3 | General Education Elective | 3 |
| BME 5XX00 or other approved grad Elective* | 3 | General Education Elective | 3 |
| TOTAL SCH | 15 | | 12 |

* The four BME electives must be selected in consultation with an advisor to form an appropriate Depth Area.

Summer after Fourth Year

| <i>Summer Session</i> | SCH |
|-----------------------|------------|
| BME 69800 | 2-3 |
| TOTAL SCH | 2-3 |

Fifth Year

| <i>First Semester</i> | SCH | <i>Second Semester</i> | SCH |
|---|-----|---|-----|
| Approved graduate MATH or STAT (if not taken during 4 th Year) or BME 59500 or 69500 | 3 | Approved graduate life-science (if not taken during Fourth Year) or engineering | 3 |
| BME 59500 or 69500 | 3 | Approved graduate life-science (if not taken during Fourth Year) or engineering | 3 |
| BME 69800 | 2-3 | BME 69800 | 2-3 |

| | | | |
|------------------|------------|--|------------|
| TOTAL SCH | 8-9 | | 8-9 |
|------------------|------------|--|------------|

Summer after Fifth Year

| | |
|-----------------------|------------|
| <i>Summer Session</i> | SCH |
| BME 69800 | 0-3 |
| TOTAL SCH | 0-3 |

Rev. 11/22/19

TOTAL SCH = 151

Notes: Additional time beyond the fifth year may be required to complete the thesis. Thesis students should work with their advisors on how best to manage research progress and enrollment in BME 69800 thesis research credits.

A student who is on-track to complete all BS requirements by the end of the 8th semester may take one of the fifth-year graduate courses during the 2nd semester of the 4th year.

Declaration of Intent to Pursue the Combined MS/BS BME Degree

For undergraduate BME students intending to pursue the 5-year BS/MS program in BME

Return to: Department of Biomedical Engineering, SL 220 by **February 15th**

Date submitted: _____

PERSONAL INFORMATION:

Student ID number: _____

Name: _____
Last First Middle

Contact Address: _____
Street City State Zip

Telephone: _____ E-mail address: _____

ACADEMIC INFORMATION:

Expected completion date of BS BME degree requirements (Month/Year): _____

BME Depth Area: _____ Thesis or Non-thesis MS: _____

Research area of interest if planning to pursue Thesis MS: _____

Potential Thesis Research Advisor: _____

Signature: _____

Note: Each student needs to apply separately for BS BME graduation and MS BME graduation by the Purdue School of Engineering & Technology deadlines (see: <https://et.iupui.edu/students/graduation/>).