

TO: The Faculty of the College of Engineering

FROM: The Faculty of the School of Biomedical Engineering

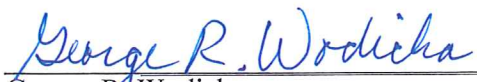
RE: Addition of non-thesis Master's option to current approved BS/MS program

The Faculty of the School of Biomedical Engineering has approved the following addition of a non-thesis professional option to our current BS/MS degree in Biomedical Engineering effective for students entering the Weldon School for the Fall Semester 2018. This action is now submitted to the Engineering Faculty with a recommendation for Fast-Track approval.

The proposed changes are as follows:

1. **Updated degree requirements to meet professional master's requirement.** Since non-thesis Master's students will not participate in research, those credits will need to be made up. The 9 credits of research will be replaced with professional skills and regulatory affairs courses.
2. **Updated recommendation instructions.** For a thesis BS/MS student, a letter of recommendation is required by the faculty member that the student will be conducting research with. For the professional Master's, the letter can be from a faculty member, internship or co-op advisor or other representative that can speak to the student's capability to succeed in this program.
3. **Updated Plan of Study Form.** The form has been updated to match the course requirements for the degree.
4. **Sample Plan of Study.** A sample plan of study for the non-thesis BS/MS has been included.

Reason: With over 60% of each class of students going into industry roles after graduation from our BS degree program, we realized the need for a combined degree BS/MS program that focuses on industry training. This combined degree will differ from the existing thesis track in that it focuses on the professional skills needed for industry rather than research/academic careers. The ultimate plan of study is intended to prepare students for leadership positions in project management and product engineering. The benefit to the student is that he/she can gain critical academic knowledge (e.g. regulatory issues, project management, etc.) through coursework completed in less than a year and pursue the industry immersion or career sooner than a regular professional MS.


George R. Wodicka
Dane A. Miller Head and Professor
Weldon School of Biomedical Engineering

Memo

To: Graduate School, Dr. Linda Mason
From: Biomedical Engineering, Dr. George Wodicka
Office of the Dean, Dr. Eckhard Groll
Date: 5/7/2018
Subject: Addition of non-thesis Master's option to current approved BS/MS program

We would like to propose the following changes for Fall 2018 to the current combined BS/MS BME program (Fifth year; Master's):

1. **Updated degree requirements to meet professional master's requirement.** Since non-thesis Master's students will not participate in research, those credits will need to be made up. The 9 credits of research will be replaced with professional skills and regulatory affairs courses.
2. **Updated recommendation instructions.** For a thesis BS/MS student, a letter of recommendation is required by the faculty member that the student will be conducting research with. For the professional Master's, the letter can be from a faculty member, internship or co-op advisor or other representative that can speak to the student's capability to succeed in this program.
3. **Updated Plan of Study Form.** The form has been updated to match the course requirements for the degree.
4. **Sample Plan of Study.** A sample plan of study for the non-thesis BS/MS has been included.

Combined BS BME/Professional MS BME (Fifth-Year, non-Thesis)

Purdue University
Weldon School of Biomedical Engineering

Fall 2017

Combined BS BME/Professional MS BME (Fifth-Year, non-thesis)

Purdue University Weldon School of Biomedical Engineering

Signature of Department Head
(Weldon School of Biomedical Engineering)

Date

Signature of Academic Dean
(College of Engineering)

Date

Dean of the Graduate School

Date

Provost

Date

Proposed Combined BS BME/Professional MS BME (Fifth-Year, non-thesis)

- 1. Proposal Summary:** The faculty of the Weldon School has approved a combined degree of Bachelor's of Science in Biomedical Engineering and Master of Science in Biomedical Engineering (professional, non-thesis) as described in this document.
- 2. Degrees to be Conferred:** BS Biomedical Engineering/MS Biomedical Engineering (non-thesis, with or without industry immersion option).
- 3. Rationale and Need for the Combined Degree:** With over 60% of each class of students going into industry roles after graduation from our BS degree program, we realized the need for a combined degree BS/MS program that focuses on industry training. This combined degree will differ from the existing thesis track in that it focuses on the professional skills needed for industry rather than research/academic careers. The ultimate plan of study is intended to prepare students for leadership positions in project management and product engineering. The benefit to the student is that he/she can gain critical academic knowledge (e.g. regulatory issues, project management, etc.) through coursework completed in less than a year and pursue the industry immersion or career sooner than a regular professional MS. Also combined degree students can more easily continue industry projects started while also they were undergraduate interns or co-op students. The benefit to the program is that we retain our top undergraduate students for an additional year in our MS program and place them in higher level positions when they leave. The objectives of this combined degree program are similar to all graduate programs on campus: to attract and retain the best students at this university.
- 4. Objectives of the Combined Degree:** The plan of study is intended to prepare students for an accelerated path to leadership positions in industry. It is a special program for *outstanding* undergraduates who have the desire to establish a career in industry.

The proposed program enables students to complete the BS and the professional MS (with or without industry immersion option) at an expedited pace .

The program entails no alteration of the requirements for either degree. The only concession is the permission to count up to nine credits of 500- and/or 600-level courses taken as electives for the BS degree toward both degrees, as approved by the Graduate Council (*Policies and Procedures Manual for Administering Graduate Student Programs, Section One-Part F-Point 3a*).

5. Proposed Program Structure:

- a. Admissions requirements & process: Admission is considered during the spring semester of the student's junior year or fall of senior year, with deadlines of May 1 and October 30 for fall and spring semester start respectively. Typically, a student entering the five-year combined BS/MS program in the fall of their senior year will complete the program at the end of the spring or summer of their fifth year.

Admission requirements:

- The student must be on pace to complete sufficient courses before the end of their senior year such that 21 credit hours or less of coursework are left to be completed during final year
- Students intending on selecting the industry immersion option are encouraged to have conducted at least one session of undergraduate industry internship or co-op rotation prior to the end of their senior year.

Admission recommendations:

- 3.3 grade point average or higher in undergraduate studies
- GRE is waived for admission to program.

Procedure for applying to Fifth-Year Combined BS/Professional MS Degree Program:

- The student will first apply to the BME Graduate Program by May 1 of their junior year or Oct. 30 of Senior year to determine if admissions qualifications are met. Due in one application package are:
 - One letter of recommendation (best from internship/co-op supervisor if student wishes to continue for industry immersion option). The supervisor will be instructed to use their letter of recommendation to support the student's admission to the program and if desired to agree to support the student financially for industry immersion portion of the professional MS degree.
 - CV or resume
 - Statement of Purpose
 - Official Purdue Transcript
 - A Plan of Study (POS) outlining the fourth and fifth years which must be approved *prior* to submission with the application. The attached POS form will be used.
- Students will be notified by the BME Graduate Program by June or December if the key criteria have been met and the student should then submit an application for the Professional Master's Degree Program in BME through the Purdue Graduate School on or before August 1 or December 15 of their senior year. Instructions for submission of this application are found at <https://engineering.purdue.edu/BME/Academics/BMEGraduateProgram/Admissions/>.

- After admission to the Graduate School the students will have dual status as undergraduate and graduate students and therefore will be eligible for undergraduate financial aid until they have completed all of the BS degree requirements.

Other Guidelines

- The Combined BS BME/ Professional MS BME Program is only open to Purdue BME undergraduate students.
- Acceptance into the program is conditional upon acceptance by the Purdue Graduate School.
- No particular grade point average automatically entitles a student to be admitted to the Fifth-Year Combined BS/MS Program in BME.
- Students admitted to the program may withdraw and continue as undergraduate students. If they are awarded the BS degree and become graduate students again, they will not be permitted to use any courses that fulfilled the BS requirements on their Graduate Plan of Study.
- Students who are not making satisfactory academic progress within five years or who are not following a plan of study that will enable them to complete the program in five years will be evaluated for permission to continue in the combined degree program. Such students could lose their status as graduate students, and will not be permitted to use courses for both degrees; however, they may apply later, in the usual manner, for readmission as a graduate student. The Graduate Committee may grant exceptions for compelling reasons.

b. Degree requirements:

- 30 total credit hours
 - 30 total credit hours of graduate (500 & 600 level) coursework
 - 6 credits of BME
 - 3 credits of Quantitative/Analytical
 - 3 credits of Life Sciences
 - 12 credits of BME professional skills and regulatory affairs
 - 6 credits other graduate electives
 - An optional MS-level Project Industry Immersion (6-9 months)
 - The coursework requirements for each degree are the same as for students pursuing the degrees separately except that
 - Students in the combined degree program may use up to nine credits of 500- and 600-level coursework taken as electives for the BS degree toward both the MS and the BS programs
- The BS must be awarded prior to the award of the MS degree

c. Scope, size of the program: Program will be open to Purdue BME / Engineering undergraduate students only. Expected matriculation will be 5-15 students per year.

d. Administrative structure:

Students in this program will be advised by both the undergraduate and graduate program faculty and staff advisors and are expected to fully integrate into the graduate program.

6. **Sustainability and Impact on the State.** Biomedical engineers play key roles in medical product and service companies, of which there are more than 700 in Indiana. The larger companies in this industry -- including Boehringer Mannheim, Bristol-Myers Squibb, Eli Lilly -- have total sales exceeding \$5.5 billion and employ over 20,000 workers. On average 60% of the students entering the B.S.BME program are from Indiana. Many of these students will want to stay in Indiana for professional careers and potentially take leadership positions in these Indiana-based companies.
7. **Staffing and Infrastructure:** The BS/MS BME combined degree program will be contained within the current academic program staffing and infrastructure. No additional resources over and above present levels will be required.

Appendix

Letter of recommendation form

POS form for application to the Fifth-Year Combined BS/MS BME

MS BME requirements

POS Sample Plan of Study

Letter of recommendation form
Fifth-Year Combined BS/MS BME Program Application

Instructions for Applicant: Please give this form to either a BME faculty member, internship or co-op supervisor or any other representative you feel can verify your success in this program.

Instructions for Recommender: On this form or a separate page, please describe why you believe this student is a suitable candidate for the Fifth-Year Combined BS/MS BME professional Master's degree program and clearly indicate that you agree that this student has the potential to be a successful addition to a leadership career in industry. Please provide to the student for inclusion in his/her application package your completed recommendation letter in a sealed and signed envelope.

Please type or print legibly

BS/MS POS
Version 1.0

Student name _____

1. Course work

*For courses to be taken as an undergraduate that will count toward the MS degree requirements, place an "X" in the column marked "U/G." Note that 9 credits maximum of elective courses from the BS degree are allowed to be counted toward the MS degree.

For current listing of approved courses for graduate curriculum, please view this document:
https://engineering.purdue.edu/BME/Academics/BMEGraduateProgram/Documents/Core_course_memo.pdf

A. BME Courses (minimum 6 credits)

U/G*	Course number	Course title	Credits	Semester (F,Sp,Sum/year)

B. Life Science Courses (minimum 3 credits)

U/G*	Course number	Course title	Credits	Semester (F,Sp,Sum/year)

C. Quantitative/Analytical Courses (minimum 3 credits)

U/G*	Course number	Course title	Credits	Semester (F,Sp,Sum/year)

D. Other Graduate Level (minimum 6 credits)

U/G*	Course number	Course title	Credits	Semester (F,Sp,Sum/year)

E. Professional Development/Regulatory Affairs (minimum 12 credits)

U/G*	Course number	Course title	Credits	Semester (F,Sp,Sum/year)

2. Internship Experience (optional)

Companies Interest In	Prior Work Experience	Preferred semester/s for Industry Immersion

3. Required Signatures to show approval of proposed Plan of Study:

Student

Date

Date

Professional Master's Coordinator

MS BME Curriculum Requirements

30 total credit hours of course work and research:

- 30 total credit hours of graduate (500 & 600 level) course work
- 6 credit hours: BME
- 3 credit hours: Quantitative / Analytical
- 3 credit hours: Life Sciences
- 12 credit hours: Professional Development and Regulatory Affairs
- 6 credit hours: Other Graduate Coursework
- Students must maintain a 3.0 GPA and must receive a B- or better in all courses on the Plan of Study

Sample Plan of Study - BS/MS in Biomedical Engineering(Biomedical Device Development)

1-Year Biomedical Device Development Degree

Fall 1

Course No.	Course Name	Credits
BME 521	Biosensors: Fundamentals and Applications(BME)	3
MGMT 600	Accounting for Managers (Prof. Skills)	3
BME 595	Biomedship (REG)	3
	Elective Course	3
Total Credits Fall 1:		12

Spring 1

Course No.	Course Name	Credits
BME 595	Regulatory Issues Approvals of Biomedical Devices (Reg)	3
IE 546	Economic Decision in Engineering (Prof. Skills)	3
	Elective Course	3
Total Credits Spring 1:		9

Credits from BME undergraduate degree also applied to Master's Degree:

Up to 9 credits of graduate level courses taken from the undergraduate BME engineering degree may be applied to the 5th year Masters.

Total Credits: 9

Course No.	Course Name	Competency Area	Credits
BME 556	Intro to Clinical Medicine (Fall Course)	Life Science	3
BME 501	Biostatistics (Fall Course)	Quantitative	3
BME 595	Human Motion Kinetics (Spring)	BME	3
Total Credits Taken as UG:			9

