

To: The Faculty of the College of Engineering

From: The Faculty of the School of Mechanical Engineering

RE: Change in degree requirements for the Bachelor of Science in Mechanical (B.S.ME) effective for students entering the School of Mechanical Engineering Fall 2019 and later.

The faculty of the School of Mechanical Engineering has approved the following change in the B.S.ME degree requirements. This action is now submitted to the Engineering Faculty with a recommendation for approval.

The ME Faculty have approved adding all ME 300-, 400- and 500-level electives as options for the Restricted Electives (REs) and increasing the number of Restricted Electives from the current two REs to three REs. The credits for the third RE would come from eliminating one 3 cr Technical Elective (TE). This would result in a change from requiring 2 of 3 RE options (ME 300, ME 452, and ME 475) to now requiring 3 REs with a broad array of ME Elective options. This will permit students to better specialize their background in areas of greatest interest (like manufacturing and advanced analysis). Finally, the name of the ME Restricted Electives will moving forward be simply called ME Electives (MEEs).


Reason: Feedback from the annual Alumni Survey has shown strong support for increasing the opportunities for ME students to access manufacturing experiences and advanced analysis experiences (like numerical methods and finite element analysis). Currently, there is little opportunity to develop background in these areas in the ME core curriculum. By adding more flexibility for students by including all ME 300-, 400-, and 500-level elective courses as MEE options. In this model, each Area has the opportunity to interest students in their elective options that they offer. To grow student interest, it will be incumbent upon each Area to provide quality experiences in their core courses and effectively promote their elective options. Students will demonstrate their interest by voting with their feet.

Implications:

- **Credit Neutral** – Adding a third Restricted Elective (3 crs) is balanced by eliminating one Technical Elective (3crs), thus maintaining the current 128 crs required for graduating with a BSME degree.
- **More Mechanical Engineering Emphasis** - By adding a third RE, there is more Mechanical Engineering emphasis in the ME curriculum.
- **Broader MEE Options** – With this change students will have three required MEEs with numerous options. This will give students even more freedom to select the MEEs that best fit the career path they intend to pursue.
- **Three Technical Electives (TEs) Retained** – By retaining three TEs in the ME Curriculum students still have the freedom to pursue most all technical minors (MA, CS, ECE, MGMT, etc.), although some may now require an extra class to complete the minor.
- **Addresses Alumni Feedback** – This change addresses the feedback from alumni recommending more opportunities for students to have access to manufacturing and advanced analysis experiences among other topics.

- **Reduces Enrollment Limitations** – In the past several students wanted to take ME 30000, ME 45200 and ME 47500 (using one as a TE). However, because of the heavy enrollment in each of these classes, we had to limit students to only taking two of these three options to make sure there was space for all ME students to complete their two MEEs. With added MEE options, the enrollments will likely allow students to take any or all of the MEEs they so choose.

Finally, since this change only impacts the ME Curriculum, no other engineering programs will be impacted. Changes in the ME Curriculum description below are noted in red.



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BSME Degree Minimum Requirements

Introduction

The Bachelor of Science in Mechanical Engineering degree requires a total of 128 credit hours and a minimum Graduation Index of 2.0. Students must qualify for admission into the School of Mechanical Engineering by completion of the First-Year Engineering Program and meeting the necessary grade requirements (EAI – Engineering Admissions Index and the Cumulative GPA) as defined by the School of Mechanical Engineering.

ME Core Requirements (65 credit hours):

ME Core Curriculum (30 credit hours): ME 20000, 27000, 27400, 30900, 31500, 32300, 35200, 36500, 37500.

ME Seminars (1 credit hour): ME 29000. ME 29000 counts as the Science, Technology and Society (STS) Foundational Outcome requirement.

ME Technical Electives (9 credit hours): Choose 9 credits of Technical Electives primarily from upper-level engineering courses (all engineering disciplines), upper-level hard sciences (Chemistry, Mathematics, Physics, Biology, etc.), or select upper-level Management courses. These courses can be used to meet core ME requirements while simultaneously meeting minor requirements. A more complete description of the Technical Elective options and a list of pre-approved choices can be found at:

<https://engineering.purdue.edu/ME/Academics/Undergraduate/METechElects.html>

ME Electives (9 credit hours): Students are required to complete three ME Electives. Any of these courses not taken for ME Elective credit may be taken for Technical Elective credit or Free Elective credit. There are numerous available options for the ME Elective.

Sophomore Design Requirement (3 credit hours): ME 26300 (taken in one semester).

Senior Design Requirement (3 credit hours): ME 46300 (taken in one semester). A prerequisite for Senior Design (ME 46300) is completion of the ME Core Curriculum (especially the immediate prerequisites: ME 31500, ME 35200, ME 37500, and MSE 23000). In exceptional cases (and only with approval), students may be permitted to take one of these four prerequisite ME Core Courses concurrently with ME 46300.

Non-ME Core Courses (10 credit hours): Beyond the First-Year Engineering Program, students are required to complete PHYS 24100, ECE 20100, ECE 20700, and MSE 23000.

Major-Area GPA: A GPA of 2.0 or higher in the ME Core courses (sophomore-level and above) taken to satisfy the ME requirements are required to qualify for graduation with the BSEE degree. These ME Core courses include: ME 20000, 26300, 27000, 27400, 29000, 30900, 31500, 32300, 35200, 36500, 37500, 46300, Restricted Elective 1 and Restricted Elective 2; MA 26100, 26200, 30300; MSE 23000; PHYS 24100; ECE 20100, 20700;

General Engineering (4-6 credit hours):

Introduction to Engineering (4-6 credit hours): ENGR 13100/13200 OR ENGR 13300/EPCS 11100/12100 or ENGR 14100/14200. ENGR 13100, ENGR 13300, and ENGR 14100 also count for the Information Literacy Foundational Outcome requirement.

Mathematics Requirement (19 credit hours):

Mathematics Sequence (19 credit hours): The following MATH courses (or their equivalents) are required for the ME degree: MA 16500, MA 16600, MA 26100, MA 26200, MA 30300. If MA 16100 and/or MA 16200 are taken in place of MA 16500 and/or MA 16600, only 4 of the 5 credit hours for each course can be applied to degree requirements. Also, MA 26500 and MA 26600 can be taken in place of MA 26200. The two extra MATH credits can be used towards a student's Technical Elective requirements. Finally, MA 16500 satisfies the Mathematics/Quantitative Reasoning Foundational Outcome requirement.

Science Requirements (11-12 credit hours):

First-Year Science Sequences (11-12 credit hours): CHM 11500/12300, PHYS 17200, and one of the **Science Selectives**: BIOL 11000/11100/13100/12100 and 13500, CHM 11600/12400, CS 15900. Also, students who take the Honors version of the Introduction to Engineering Sequence (ENGR 14100/14200) automatically fulfill the three credits required for the CS 159 science selective. CHM 11500 and PHYS 17200 satisfy the two courses needed for Science Foundational Outcome requirement.

Computer Graphics Requirements (2 credit hours):

Computer Graphics Course (2 credit hours): Each student is required to complete CGT 16300.

Liberal Arts Requirement (24-25 credit hours):

Communication Skills (6-7 credit hours): One Written Communication course and one Oral Communication course is required. For the Written Communication course, ENGL 106 is recommended, but other options are available (see the link below).

<https://engineering.purdue.edu/ME/Academics/Undergraduate/WrittenCommSelective.html>

For the Oral Communication course COM 114 is recommended, but other options are available (see the link below).

<https://engineering.purdue.edu/ME/Academics/Undergraduate/OralCommSel.html>

The Written and Oral Communication courses satisfy the Written and Oral Communication Foundational Outcome requirements.

General Education Program Requirement (18 credit hours): Students must satisfy the programmatic requirements of the *General Education Program*. Eighteen credit hours of *general education electives* must be selected from the courses approved by the ME Curriculum Committee. Generally, these courses are chosen primarily from the areas of:
agricultural economics, audiology and speech sciences, child development and family studies, communication, creative arts, economics, English, foreign languages and literatures, history,

interdisciplinary studies, philosophy, political sciences, psychological sciences, and sociology and anthropology.

Two restrictions to the General Education Electives include the following:

- *Economics Elective* (3 cr. hrs.) – ECON 251 Microeconomics and ECON 252 Macroeconomics are the available options. The latter option is recommended if there is no preference. The chosen course will also serve to meet the Human Cultures: Behavioral and Social Sciences Foundational Outcome requirement.
- *World Affairs & Cultures (WAC) Elective* (3 cr. hrs.) – The World Affairs and Cultures elective should be chosen from the approved list.
<https://engineering.purdue.edu/ME/Academics/Undergraduate/WACElect.html>
Any course selected from this list will automatically fulfill the Human Cultures: Humanities Foundational Outcome requirement.

With the selection of these electives, the necessary foundational outcome requirements will automatically be satisfied.

Free Elective Requirement (3 credit hours):

Free Elective (3 credit hours): The Free Elective is designed to enable a student to take a course in most any area that they find of interest. It could be an additional Technical Elective, Restricted Elective, General Education Elective, or from any other area (e.g., Band, Technology, Physical Education, General Studies, ROTC, etc.) provided it is not a remedial course for the student and one that is not intended for engineering majors.

Foundational Outcome Courses

All courses taken to fulfill a Foundational Outcome require a grade of C- or higher in order to meet the outcome requirements.

Grade Options

All courses taken to meet a requirement for the BSME degree have to be taken for a grade. However, any excess courses may be taken on a Pass/Not Pass basis at the discretion of the student.

Campus Requirements

All 300-level and above ME courses as well as ME 26300 and ME 29000 must be taken on the West Lafayette campus unless special permission is granted by the School of Mechanical Engineering or permitted by State statute.

Exceptions

Any deviations or exceptions from the stated core curriculum must be approved by the Curriculum Committee of the School of Mechanical Engineering. Petitions must be made in writing and submitted to the Associate Head for Undergraduate Education for review. Such deviations and exceptions are rare and will be considered only in exceptional circumstances.

Sample Plan-of-Study for BSME

First Year

Semester 1			Semester 2		
ENGR 13100	Transf Ideas to Innov I (L)	2	ENGR 13200	Transf Ideas to Innov II (L)	2
MA 16500	Analytc Geom & Calc I	4	MA 16600	Analytc Geom & Calc II	4
CHM 11500	General Chemistry (L)	4	Sci Sel	Science Selective (Sci Sel)	3-4
PHYS 17200	Modern Mechanics (L)	4	ENGL 10600	First-Year Composition	3-4
COM 11400	Fundament Of Speech	3	Econ EI	Econ Elective (Econ EI)	3
<i>Semester Credits = 17</i>			<i>Semester Credits = 15-17</i>		

Sophomore Year

Semester 3			Semester 4		
ME 20000	Thermodynamics I	3	ME 26300	ME Design, Innov & Entr (L)	3
ME 27000	Basic Mechanics I	3	ME 27400	Basics Mechanics II	3
ME 29000	Global Engr Prof Sem	1	MA 26200	Lin Algebra & Ord Diff Eqns	4
MA 26100	Multivariate Calculus	4	ECE 20100	Linear Circuit Anly I	3
PHYS 24100	Electricity & Optics	3	ECE 20700L	Elect Measure Techn (L)	1
CGT 16300	Graph Comm & Spat Anal	2	GEE	Gen Ed Elective (GE-1)	3
<i>Semester Credits = 16</i>			<i>Semester Credits = 17</i>		

Junior Year

Semester 5			Semester 6		
ME 30900	Fluid Dynamics (L)	4	ME 35200	Machine Design I (L)	4
ME 36500	Sys, Meas & Cntrl I (L)	3	ME 37500	Sys, Meas & Cntl II (L)	3
ME 32300	Mechanics of Materials	3	MSE 23000	Struct & Prop of Matls	3
MA 30300	Partial Diff Eqns	3	TE	Tech Elective (TE-1)	3
GEE	Gen Ed Elective (GE-2)	3	GEE	Gen Ed Elective (GE-3)	3
<i>Semester Credits = 16</i>			<i>Semester Credits = 16</i>		

Senior Year

Semester 7			Semester 8		
ME 31500	Heat & Mass Transfer (L)	4	ME 46300	Engineering Design (L)	3
MEE	ME Elective (MEE-1)	3	MEE	ME Elective (MEE-2)	3
TE	Tech Elective (TE-2)	3	MEE	ME Elective (MEE-3)	3
WAC EI	Wrld Aff & Cult EI (WAC)	3	TE	Technical Elective (TE-3)	3
Free EI	Free Elective	3	GEE	Gen Ed Elective (GE-4)	3
<i>Semester Credits = 16</i>			<i>Semester Credits = 15</i>		

Total Credits = 128 (Minimum)