ILLINOIS

Proposal to the Senate Educational Policy Committee

PROPOSAL TITLE: Revise the B.S. in Engineering Mechanics

SPONSOR: Prof. Liz Hsiao-Wecksler, MechSE Associate Head for Undergraduate Programs, 217-333-3415, ethw@illinois.edu.

COLLEGE CONTACT: Jonathan J. Makela, Associate Dean for Undergraduate Programs and Professor of Electrical and Computer Engineering, College of Engineering, 217-333-2280, jmakela@illinois.edu.

BRIEF DESCRIPTION: The MechSE Department seeks to revise the core major requirements of the Bachelor of Science in Engineering Mechanics. Specifically, the revision requested is to replace TAM 302, Engineering Design Principles, with TAM 270 (new course in Fall 2018), Design for Manufacturability. TAM 270 is cross listed with ME 270 that has existed since Fall 2015. We requested this cross listing because it will more readily distinguish Engineering Mechanics students from Mechanical Engineering students, which is necessary in the ABET accreditation process. In addition, although the ME 270 and TAM 270 syllabi and content are to remain the same, the TAM 270 rubric will allow Engineering Mechanics students to have project variations that are better suited for Engineering Mechanics students. The MechSE Department has not taught TAM 302 since Spring 2016 due to a number of reasons including a lack of instructors to teach separate TAM 302 and ME 270 lecture sections. Engineering Mechanics students are currently registered for TAM 270 that is cross listed with ME 270 and taught by one instructor in a single lecture section. This change does not alter the total number of hours required for the major. See Appendix A.

JUSTIFICATION: Due to the similarity of content between TAM/ME 270 and TAM 302, overall quality and rigor of the TAM/ME 270 design experience, desire by Engineering Mechanics students for more hands-on design projects to prepare them for their future careers, and desire for students to work in multidisciplinary teams, the MechSE Undergraduate Programs Committee and MechSE student leadership board unanimously recommended approval of TAM 270 replacing the TAM 302 requirement. In addition, the MechSE Department has seen a significant increase in enrollments, which is making it more difficult to find instructors to fill all lecture sections. By requiring Engineering Mechanics students to take TAM 270 (cross listed with ME 270 and taught by one instructor in a single lecture section) instead of TAM 302 eliminates the need to identify another

instructor to teach TAM 302. MechSE requests removal of TAM 302 from the course offerings if the present proposal is approved.

BUDGETARY AND STAFF IMPLICATIONS:

1) Resources
    a. MechSE will not need to seek campus or other external resources; no additional resources are necessary for this revision.

2) Resource Implications
    This revision should have minimal impact on faculty resources since TAM 270 is currently cross listed with ME 270 and taught by one instructor in a single lecture section. The increased section enrollment by Engineering Mechanics students can readily be accommodated, and MechSE would not require an additional instructor to teach TAM 302. There is no foreseen impact on the University Library.

DESIRED EFFECTIVE DATE: Spring 2019

STATEMENT FOR PROGRAMS OF STUDY CATALOG: Please see Appendix B for final version.

CLEARANCES:

Signatures:

_____	_____
Unit Representative:	Date:
_____	_____
College Representative:	Date:
_____	_____
Graduate College Representative:	Date:
_____	_____
Council on Teacher Education Representative:	Date:

Appendix A:
(Proposed Curriculum Revisions)

Current Requirements:	Current Hours	Revised Requirements:	Revised Hours
Major Core Requirement		***Major Core Requirement***	
TAM 302 – Engineering Design Principles	3 Hours	TAM 270 – Design for Manufacturability	3 Hours

Appendix B:
(Program of Study Revisions)

Orientation and Professional Development

These courses introduce the opportunities and resources your college, department, and curriculum can offer you as you work to achieve your career goals. They also provide the skills to work effectively and successfully in the engineering profession.

Code	Title	Hours
ENG 100	Engineering Orientation [1]	0
TAM 195	Mechanics in the Modern World	1
ME 290	Seminar	0
Total Hours		**1**

Course List

[1] *External transfer students take ENG 300 instead.*

Foundational Mathematics and Science

These courses stress the basic mathematical and scientific principles upon which the engineering discipline is based.

Code	Title	Hours
CHEM 102	General Chemistry I	3
CHEM 103	General Chemistry Lab I	1
CHEM 104	General Chemistry II	3
CHEM 105	General Chemistry Lab II	1
MATH 221	Calculus I [1]	4
MATH 231	Calculus II	3
MATH 241	Calculus III	4
MATH 415	Applied Linear Algebra	3
MATH 441	Differential Equations	3
MATH 442	Intro Partial Diff Equations	3
PHYS 211	University Physics: Mechanics	4
PHYS 212	University Physics: Elec & Mag	4
PHYS 213	Univ Physics: Thermal Physics	2
PHYS 214	Univ Physics: Quantum Physics	2
Total Hours		**40**

Course List

[1] *MATH 220 may be substituted, with four of the five credit hours applying toward the degree. MATH 220 is appropriate for students with no background in calculus.*

Engineering Mechanics Technical Core

These courses stress fundamental concepts and basic laboratory techniques that comprise the common intellectual understanding of engineering mechanics.

Code	Title	Hours
CS 101	Intro Computing: Engrg & Sci	3
ECE 205	Electrical and Electronic Circuits	3
ME 170	Computer-Aided Design	3
ME 200	Thermodynamics	3
ME 470	Senior Design Project	3
TAM 211	Statics	3
TAM 212	Introductory Dynamics	3
TAM 251	Introductory Solid Mechanics	3
TAM 252	Solid Mechanics Design	1
TAM 270	Design for Manufacturability	3
TAM 324	Behavior of Materials	4
TAM 335	Introductory Fluid Mechanics	4
TAM 412	Intermediate Dynamics	4
TAM 445	Continuum Mechanics	4
TAM 470	Computational Mechanics	3
Total Hours		**47**

Course List

Secondary Field Option Electives

This component of the curriculum enables the student to specialize further by electing a secondary field, a coherent group of technical courses in mechanics and closely related subjects. The current secondary fields are:

- Biomechanics
- Computational Mechanics
- Engineering Science and Applied Mathematics
- Experimental Mechanics
- Fluid Mechanics
- Mechanics of Materials
- Solid Mechanics

Each secondary field generally specifies two required courses and two additional courses from a list of approved elective courses. For each of the secondary fields, the required and approved elective courses specified for them are indicated on the Engineering Mechanics Secondary Field Webpage. To add flexibility to the program and to accommodate particular interests, the student may petition to substitute appropriate courses, including 500-level courses if the student has the adequate preparation, for any of the secondary field elective courses. Without petition, a student may select any one course listed as required in one of the secondary field options to satisfy elective course credits in a chosen secondary field.

Code	Title	Hours

Code	Title	Hours
Secondary field electives selected from departmentally approved courses for Secondary Field Options.		12

Course List

Liberal Education

The liberal education courses develop students' understanding of human culture and society, build skills of inquiry and critical thinking, and lay a foundation for civic engagement and lifelong learning.

Code	Title	Hours
Electives from the campus General Education Social and Behavioral Sciences list.		6
Electives from the campus General Education Humanities and the Arts list.		6
Electives either from a list approved by the college, or from the campus General Education lists for Social and Behavioral Sciences or Humanities and the Arts.		6
Total Hours		**18**

Course List

Students entering after the Spring 2018 semester must also complete the campus cultural studies requirement by completing (i) one western/comparative culture(s) course, (ii) one non-western course and (iii) one U.S. minority culture(s) course from the General Education cultural studies lists. Students entering prior to the Spring 2018 semester will need to complete requirements (i) and either (ii) or (iii). Most students select liberal education courses that simultaneously satisfy these cultural studies requirements. Courses from the western, non-western and U.S. minority culture(s) lists that fall into free electives or other categories may also be used to satisfy the cultural studies requirements.

Composition

These courses teach fundamentals of expository writing.

Code	Title	Hours
RHET 105	Writing and Research	4
Advanced Composition (satisfied by completing TAM 324 and ME 470 in the Engineering Mechanics Technical Core)		
Total Hours		**4**

Course List

Free Electives

These unrestricted electives, subject to certain exceptions as noted at the College of Engineering Advising Website, give the student the opportunity to explore any intellectual area of unique interest. This freedom plays a critical role in helping students to define research specialties or to complete minors.

Code	Title	Hours
Free electives. Additional unrestricted course work, subject to certain exceptions as noted at the College of Engineering Advising Website, so that there are at least 128 credit hours earned toward the degree.		6

Course List

Suggested Sequence

The schedule that follows is illustrative, showing the typical sequence in which courses would be taken by a student with no college course credit already earned and who intends to graduate in four years. Each individual's case may vary, but the position of required named courses is generally indicative of the order in which they should be taken.

First Year		
First Semester		**Hours**
CHEM 102	General Chemistry I	3
CHEM 103	General Chemistry Lab I	1
Liberal education elective[3]		3
ENG 100	Engineering Orientation	0
MATH 221[1]	Calculus I	4
RHET 105 or ME 170[2]	Writing and Research	4-3
TAM 195	Mechanics in the Modern World	1
	Semester Hours	**16-15**
Second Semester		
Liberal education elective[3]		3
MATH 231	Calculus II	3
ME 170 or RHET 105[2]	Computer-Aided Design	3-4
CHEM 104	General Chemistry II	3
CHEM 105	General Chemistry Lab II	1
PHYS 211	University Physics: Mechanics	4
	Semester Hours	**17-18**
Second Year		
First Semester		
Liberal education elective[3]		3
CS 101	Intro Computing: Engrg Sci	3
MATH 241	Calculus III	4
PHYS 212	University Physics: Elec Mag	4
TAM 211	Statics	3
ME 290	Seminar	0
	Semester Hours	**17**
Second Semester		
ECE 205	Electrical and Electronic Circuits	3
PHYS 213	Univ Physics: Thermal Physics	2
PHYS 214	Univ Physics: Quantum Physics	2
TAM 212	Introductory Dynamics	3
TAM 251	Introductory Solid Mechanics	3
TAM 252	Solid Mechanics Design	1
Liberal education elective[3]		3
	Semester Hours	**17**

Third Year		
First Semester		
MATH 415	Applied Linear Algebra	3
ME 200	Thermodynamics	3
TAM 270	Design for Manufacturability	3
TAM 335	Introductory Fluid Mechanics	4
Free elective		3
	Semester Hours	**16**
Second Semester		
MATH 441	Differential Equations	3
TAM 324	Behavior of Materials	4
TAM 412	Intermediate Dynamics	4
TAM 445	Continuum Mechanics	4
	Semester Hours	**15**
Fourth Year		
First Semester		
MATH 442	Intro Partial Diff Equations	3
ME 470 or Secondary field elective[4]	Senior Design Project	3
TAM 470	Computational Mechanics	3
Secondary field elective[4]		3
Liberal education elective[3]		3
	Semester Hours	**15**
Second Semester		
ME 470 or Secondary field elective[4]	Senior Design Project	3
Secondary field electives[4]		6
Liberal education elective[3]		3
Free elective		3
	Semester Hours	**15**
	Total Hours:	**128**

[1] *MATH 220 may be substituted, with four of the five credit hours applying toward the degree. MATH 220 is appropriate for students with no background in calculus.*

[2] *RHET 105 may be taken in the first or second semester of the first year as authorized. The alternative is ME 170.*

[3] *Liberal education electives must include 6 hours of social & behavioral sciences and 6 hours of humanities & the arts course work from the campus General Education lists. The remaining 6 hours may be selected from a list maintained by the college, or additional course work from the campus General Education lists for social & behavioral sciences or humanities & the arts. Students must also complete the campus cultural studies requirement by completing (i) one western/comparative culture(s) course and (ii) one non-western/U.S.*

minority culture(s) course from the General Education cultural studies lists. Most students select liberal education courses that simultaneously satisfy these cultural studies requirements. Courses from the western and non-western lists that fall into free electives or other categories may also be used to satisfy the cultural studies requirements.

[4] *Selected from departmentally approved lists of Secondary Field Electives.*