



Proposal to the Senate Educational Policy Committee

PROPOSAL TITLE: Change course requirements in the undergraduate Engineering Mechanics curriculum in the Department of Mechanical Science and Engineering: (i) change ME 470 from an option to a requirement; (ii) change ME 170 from an option to a requirement; (iii) remove GE 101 from the list of required coursework; (iv) include ME 390 as a requirement for sophomore students.

SPONSOR: Prof. Elizabeth Hsiao-Weckler, MechSE Associate Head for Undergraduate Programs, (217)333-3415, ethw@illinois.edu

COLLEGE CONTACTS:

Kevin Pitts, Associate Dean for Undergraduate Programs and Professor in Physics, College of Engineering, (217) 333-3946, kpitts@illinois.edu

BRIEF DESCRIPTION:

ME 470: Engineering Mechanics students in the Mechanical Science and Engineering Department previously had the option of taking ME 470 (3cr) among other options for their Design Elective, but it is now the only course on the design elective list. We propose to explicitly require ME 470 for EM students instead of listing it as a design elective.

ME 170: Engineering Mechanics students in the Mechanical Science and Engineering Department currently have the option of taking GE 101 (3cr) Engineering Graphics & Design or ME 170 (3) Computer-Aided Design. We propose to eliminate the option of taking GE 101 (3cr) for Engineering Mechanics students, and instead require ME 170.

ME 390: Include ME 390 (0 credit seminar) as a required course for Engineering Mechanics students. This course covers ethics and practice of mechanical engineering/engineering mechanics and their relationship to other fields of engineering, to economics, and to society.

JUSTIFICATION:

ME 470: The MechSE Undergraduate Programs Committee in consultation with the MechSE Student Society Board proposed to require ME 470 thereby eliminating the Capstone Design Elective option for EM students since it is easier to measure attainment of ABET outcomes. Furthermore, ME and EM students alike benefit from each other's presence in the ME 470 design projects. Finally, 100% of EM students have elected to take ME 470 as their Design Elective for the last two academic years.

ME 170: The MechSE Undergraduate Programs Committee in consultation with the MechSE Student Society Board proposed to remove the option of taking GE101 for Engineering Mechanics students since ME 170 best prepares Engineering Mechanics students for their subsequent curriculum. Furthermore, no freshman Engineering Mechanics student elected to take GE 101 this year and only two took GE 101 in the previous year.

ME 390: The MechSE Undergraduate Programs Committee in consultation with the MechSE Student Society Board proposed the requirement of ME 390, as the topics covered would be beneficial to Engineering Mechanics students.

BUDGETARY AND STAFF IMPLICATIONS: *(Please respond to each of the following questions.)*

1) Resources

- a. How does the unit intend to financially support this proposal?

MechSE has been supporting all Engineering Mechanics students in ME 470 for the past two years.

MechSE has been supporting all Engineering Mechanics students in ME 170 for the last two years and plans to continue to do so.

MechSE does not anticipate any increase in required support for the increase in enrollment in ME 390 since there will not be an increase in the number of sections, nor other anticipated costs associated with the course.

- b. How will the unit create capacity or surplus to appropriately resource this program? If applicable, what functions or programs will the unit no longer support to create capacity?

MechSE was able to accommodate all of the EM students in existing sections of ME 470.

MechSE increased the size of ME 170 during the past two years and intends to continue to do so for EM students.

MechSE plans to increase the section size by approximately 15% in ME 390 to accommodate the EM students.

- c. Will the unit need to seek campus or other external resources? If so, please provide a summary of the sources and an indication of the approved support.

MechSE does not need additional campus or other external resources to make the present changes to ME 470, ME 170, or ME 390.

- d. Please provide a letter of acknowledgment from the college that outlines the financial arrangements for the proposed program.

No financial arrangements are required.

2) Resource Implications

- a. Please address the impact on faculty resources including the changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc.

These changes pose no additional impact on the faculty resources since all EM students have been taking ME 470.

These changes pose no additional impact on the faculty resources since all EM students have been taking ME 170 for the last two years.

The increase in capacity of ME 390 will pose little impact on the faculty resources, due to the nature of the seminar format (no additional section required and no homework for this course).

- b. Please address the impact on course enrollment in other units and provide an explanation of discussions with representatives of those units.

The proposed changes would not impact other units since: No EM students have taken a course other than ME 470 as their design elective in the last two years. ABE 469 had been accepted as a senior design elective course several years ago and they have been notified of this proposal. Please see the letter of acknowledgement from the ABE department included in Appendix A. No EM freshmen currently take GE 101 and the ISE department has been notified of this proposal. Please see the letter from the ISE department included in Appendix B.

- c. Please address the impact on the University Library

There is no foreseen impact to the University Library.

- d. Please address the impact on technology and space (e.g. computer use, laboratory use, equipment, etc.)

The proposed changes would not impact technology and space since all EM students have been taking ME 470 for the last two years.

The proposed changes would not impact technology and space since all EM students have been taking ME 170 for the last two years.

The proposed changes would not impact technology and have minimal impact on space since ME 390 is typically assigned a lecture hall with sufficient space for the additional proposed EM students.

For new degree programs only:

- 3) Briefly describe how this program will support the University's mission, focus, and/or current priorities. Include specific objectives and measurable outcomes that demonstrate the program's consistency with and centrality to that mission.
- 4) Please provide an analysis of the market demand for this degree program. What market indicators are driving this proposal? What type of employment outlook should these graduates expect? What resources will be provided to assist students with job placement?
- 5) If this is a proposed graduate program, please discuss the programs intended use of waivers. If the program is dependent on waivers, how will the unit compensate for lost tuition revenue?

DESIRED EFFECTIVE DATE: Spring 2016

STATEMENT FOR PROGRAMS OF STUDY CATALOG: Please see the proposed change to the program of study tracked below.

Bachelor of Science in Engineering Mechanics

mechse.illinois.edu

Undergraduate Program Office: 154 Mechanical Engineering Building

Fax: (217) 244-6534

E-mail: mechse-ug-advise@illinois.edu

For the Degree of Bachelor of Science in Engineering Mechanics

Engineering mechanics is the discipline devoted to the solution of mechanics problems through integrated application of mathematical, scientific, and engineering principles. Special emphasis is placed on the physical principles underlying modern engineering design.

The program derives its strength from rigorous treatments of statics, dynamics, solid mechanics, fluid mechanics, and mechanics of materials. These topics form the basis of all the mechanical sciences and have wide applicability in modern engineering. Students in engineering mechanics also develop a strong background in mathematics, physics, and chemistry, while specializing in one of several secondary fields within mechanics, such as experimental mechanics.

Special emphasis is placed on advanced dynamics, continuum mechanics, and the rapidly emerging field of computational mechanics. Laboratory experiments in fluid mechanics and mechanics of materials complement an integrated design sequence, starting in the freshman year, which culminates in a team-based design project in one of the professional engineering disciplines, such as aerospace, civil, or mechanical engineering. Students also

have the opportunity for independent, creative work in a one-on-one or small group environment under the supervision of a faculty member.

Overview of Curricular Requirements

The curriculum requires 128 hours for graduation and is organized as shown below.

Technical grade point average requirements for graduation and advanced-level course registration apply to students in this curriculum. These rules are summarized at the College of Engineering's [undergraduate advising website](#).

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.

<u>ENG 100</u>	Engineering Orientation ¹	0
<u>TAM 195</u>	Mechanics in the Modern World	1
ME 390	Seminar	0
Total Hours		1

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.

<u>CHEM 102</u>	General Chemistry I	3
<u>CHEM 103</u>	General Chemistry Lab I	1
<u>CHEM 104</u>	General Chemistry II	3
<u>CHEM 105</u>	General Chemistry Lab II	1
<u>MATH 221</u>	Calculus I ¹	4
<u>MATH 231</u>	Calculus II	3
<u>MATH 241</u>	Calculus III	4
<u>MATH 415</u>	Applied Linear Algebra	3
		OR
		4
<u>MATH 441</u>	Differential Equations	3
<u>MATH 442</u>	Intro Partial Diff Equations	3
<u>PHYS 211</u>	University Physics: Mechanics	4
<u>PHYS 212</u>	University Physics: Elec & Mag	4

<u>PHYS 213</u>	Univ Physics: Thermal Physics	2
<u>PHYS 214</u>	Univ Physics: Quantum Physics	2
Total Hours		40

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.

<u>CS 101</u>	Intro Computing: Engrg & Sci	3
<u>ECE 205</u>	Elec & Electronic Circuits	3
<u>ME 170</u>	Computer-Aided Design	3
<u>ME 300</u>	Thermodynamics	3
<u>TAM 211</u>	Statics	3
<u>TAM 212</u>	Introductory Dynamics	3
<u>TAM 251</u>	Introductory Solid Mechanics	3
<u>TAM 252</u>	Solid Mechanics Design	1
<u>TAM 302</u>	Engineering Design Principles	3
<u>TAM 324</u>	Behavior of Materials	4
<u>TAM 335</u>	Introductory Fluid Mechanics	4
<u>TAM 412</u>	Intermediate Dynamics	4
<u>TAM 445</u>	Continuum Mechanics	4
<u>TAM 470</u>	Computational Mechanics	3
Total Hours		44

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.

Secondary field electives selected from departmentally approved courses for Secondary Field Options.	12
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Senior Design Requirement

<u>ME 470</u>	Senior Design Project	3
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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.

Electives from the campus General Education social & behavioral sciences list.	6
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Electives from the campus General Education humanities & the arts list.	6
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Electives either from a list approved by the college, or from the campus General Education lists for social & behavioral sciences or humanities & the arts.	6
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Total Hours	18
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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 satisfy the cultural studies requirements.

Composition

These courses teach fundamentals of expository writing.

<u>RHET 105</u>	Writing and Research	4
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Advanced Composition (satisfied by completing TAM 324 in the Engineering Mechanics Technical Core)	
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Total Hours	4
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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.

Free electives. Additional unrestricted course work, subject to certain exceptions as noted at the College of Engineering advising Web site, so that there are at least 128 credit hours earned toward the degree.	6
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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
<u>CHEM 102</u>	General Chemistry I	3
<u>CHEM 103</u>	General Chemistry Lab I	1
Liberal education elective ³		3
<u>ENG 100</u>	Engineering Orientation	0
<u>MATH 221</u> ¹	Calculus I	4
<u>RHET 105</u> or <u>ME170</u> ²	Writing and Research	4-3
<u>TAM 195</u>	Mechanics in the Modern World	1
Semester Hours		16-15

Second Semester

Liberal education elective ³		3
<u>MATH 231</u>	Calculus II	3
<u>ME170</u> or <u>RHET 105</u> ²	Computer Aided Design	3-4
<u>CHEM 104</u>	General Chemistry II	3
<u>CHEM 105</u>	General Chemistry Lab II	1
<u>PHYS 211</u>	University Physics: Mechanics	4
Semester Hours		17-18

Second Year

First Semester

Liberal education elective ³		3
<u>CS 101</u>	Intro Computing: Engrg Sci	3
<u>MATH 241</u>	Calculus III	4
<u>PHYS 212</u>	University Physics: Elec Mag	4
<u>TAM 211</u>	Statics	3
Semester Hours		17

Second Semester

<u>ECE 205</u>	Elec Electronic Circuits	3
<u>PHYS 213</u>	Univ Physics: Thermal Physics	2
<u>PHYS 214</u>	Univ Physics: Quantum Physics	2

<u>TAM 212</u>	Introductory Dynamics	3
<u>TAM 251</u>	Introductory Solid Mechanics	3
<u>TAM 252</u>	Solid Mechanics Design	1
Liberal education elective ³		3
Semester Hours		17
Third Year		
First Semester		
<u>MATH 415</u>	Applied Linear Algebra	3 OR 4
<u>MATH 441</u>	Differential Equations	3
<u>ME 300</u>	Thermodynamics	3
<u>TAM 324</u>	Behavior of Materials	4
<u>TAM 335</u>	Introductory Fluid Mechanics	4
Semester Hours		17
Second Semester		
<u>MATH 442</u>	Intro Partial Diff Equations	3
<u>TAM 302</u>	Engineering Design Principles	3
<u>TAM 412</u>	Intermediate Dynamics	4
<u>TAM 445</u>	Continuum Mechanics	4
Semester Hours		14
Fourth Year		
First Semester		
<u>TAM 470</u>	Computational Mechanics	3
ME 470 (or Secondary field elective) ⁴		6
Liberal education elective ³		3
Free elective		3
Semester Hours		15
Second Semester		
<u>ME 470</u> (or Secondary Field elective) ⁴	Senior Design Project	3
Secondary field elective 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.

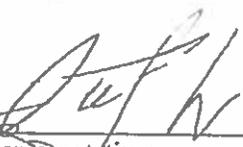
² RHET 105 may be taken in the first or second semester of the first year as authorized. The alternative is ME 170.

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 satisfy the cultural studies requirements.*

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

CLEARANCES: (Clearances should include signatures and dates of approval. These signatures must appear on a separate sheet. If multiple departments or colleges are sponsoring the proposal, please add the appropriate signature lines below.)

Signatures:



Unit Representative:

09-04-15

Date:



~~Unit Representative:~~

10-22-15

Date:

College Representative:

9/14/15

Date:

Graduate College Representative:

Date:

Council on Teacher Education Representative:

Date:

Appendix A: (Proposed Curriculum Revisions)

From: Hansen, Alan Christopher
Sent: Tuesday, September 23, 2014 3:58 PM
To: Jassim, Emad W; Zhang, Yuanhui
Cc: Alleyne, Andrew G; Zahos, Stephen C
Subject: RE: EM Capstone Design Elective Requirements

Dear Emad:

Thank you very much for letting us know about this capstone design proposal. While it has been beneficial to have the EM students involved in our projects, there should be no negative impacts from there being no EM students taking ABE 469 in the future.

Regards,
Al

From: Jassim, Emad W
Sent: Tuesday, September 23, 2014 2:59 PM
To: Zhang, Yuanhui
Cc: Alleyne, Andrew G; Hansen, Alan Christopher
Subject: RE: EM Capstone Design Elective Requirements

Dear Yuanhui,

I am just following up on the email below regarding the EM Capstone Design Elective Requirements.

I look forward to hearing from you.

Thank you,

Emad

Emad W. Jassim, Ph.D., P.E.
Director of Undergraduate Programs
Department of Mechanical Science and Engineering
University of Illinois
156 Mechanical Engineering Building, MC-244
1206 W. Green St.
Urbana, IL 61801

From: Jassim, Emad W
Sent: Thursday, September 18, 2014 4:18 PM
To: Zhang, Yuanhui
Cc: Alleyne, Andrew G
Subject: EM Capstone Design Elective Requirements

Dear Yuanhui,

The MechSE Undergraduate Programs Committee in consultation with the MechSE Student Society Board proposed to make ME 470 the only Capstone Design Elective option for EM students since it is easier for us to measure attainment of ABET outcomes, ME students benefit from the presence of EM students in the ME 470 design projects, and no EM student elected to take a course other than ME 470 in the last two academic years. Consequently, ABE 469 would no longer be accepted as a Capstone Design Elective.

Do you see any impact to ABE with this change?

Thank you,

Emad

Emad W. Jassim, Ph.D., P.E.
Director of Undergraduate Programs
Department of Mechanical Science and Engineering
University of Illinois
156 Mechanical Engineering Building, MC-244
1206 W. Green St.
Urbana, IL 61801
office phone: (217)244-3634
cell phone: (217)377-8249
fax: (217)244-6534 (attn. Emad Jassim)
email: jassim@illinois.edu

Appendix B:
(email correspondence)

From: Craddock, Heidi C
Sent: Friday, September 19, 2014 1:46 PM
To: Sowers, Richard B; Jassim, Emad W; Nagi, Rakesh
Cc: Alleyne, Andrew G
Subject: RE: EM ME 170 requirements

All,

This will have very little impact on us.

Regards,

Heidi

Heidi Craddock

Assistant Director of Undergraduate Programs
Department of Industrial & Enterprise Systems Engineering
104B Transportation Building, MC-238
104 South Mathews Avenue
Urbana, IL 61801
Office: (217) 244-3855
Fax: (217) 244-5705
hcraddoc@illinois.edu

From: Sowers, Richard B
Sent: Friday, September 19, 2014 9:51 AM
To: Jassim, Emad W; Craddock, Heidi C; Nagi, Rakesh
Cc: Alleyne, Andrew G
Subject: RE: EM ME 170 requirements

Andrew,

Thanks for keeping us in the loop.

Rakesh and Heidi,

Would this impact us?

Best Regards,

Rich Sowers

Professor

Department of Industrial and Enterprise Systems Engineering
Department of Mathematics
University of Illinois at Urbana-Champaign
Urbana, IL 61801
research email: richard.sowers@gmail.com
university email: r-sowers@illinois.edu (FERPA and FOIA-compliant)

From: Jassim, Emad W
Sent: Thursday, September 18, 2014 4:13 PM
To: Sowers, Richard B
Cc: Alleyne, Andrew G
Subject: EM ME 170 requirements

Dear Richard,

The MechSE Undergraduate Programs Committee in consultation with the MechSE Student Society Board proposed to remove the option of taking GE101 for Engineering Mechanics students since ME 170 prepares Engineering Mechanics

Students for their subsequent curriculum, and since no freshman Engineering Mechanics student elected to take GE101

this year and only two EM freshmen took GE 101 in the previous year.

Do you see any impact to ISE with this change?

Thank you,

Emad

Emad W. Jassim, Ph.D., P.E.
Director of Undergraduate Programs
Department of Mechanical Science and Engineering
University of Illinois
156 Mechanical Engineering Building, MC-244
1206 W. Green St.
Urbana, IL 61801
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email: jassim@illinois.edu

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

EP.16.32

Office of the Provost and Vice Chancellor
for Academic Affairs

Swanlund Administration Building
601 East John Street
Champaign, IL 61820



October 30, 2015

Bettina Francis, Chair
Senate Committee on Educational Policy
Office of the Senate
228 English Building, MC-461

Dear Professor Francis:

Enclosed is a copy of a proposal from the College of Engineering to revise the undergraduate major in Engineering Mechanics.

Sincerely,

A handwritten signature in cursive script, appearing to read 'Kathryn A. Martensen'.

Kathryn A. Martensen
Assistant Provost

Enclosures

c: A. Alleyne
K. Pitts
A. Waranyuwat
E. Jassim
R. Bhargava

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

College of Engineering
Executive Committee
306 Engineering Hall, MC-266
1308 West Green Street
Urbana, IL 61801



October 20, 2015

RECEIVED
OCT 27 2015
OFFICE OF THE PROVOST

Kristi Kuntz
Assistant Provost
217 Swanlund Administration Building
MC-304

Via: Andreas Cangellaris, Engineering College

Dear Provost Kuntz:

The College of Engineering Executive Committee has reviewed and approved the following program revision:

“Change course requirements in the undergraduate Engineering Mechanics curriculum in the Department of Mechanical Science and Engineering (i) change ME 470 from an option to a requirement; (ii) change ME 170 from an option to a requirement; (iii) remove GE 101 from the list of required coursework; (iv) include ME 390 as a requirement for sophomore students”

Attached is a copy of the request.

Sincerely yours,

Rohit Bhargava, Vice Chair
Executive Committee

Approval Recommended:

10-20-2015

Andreas Cangellaris, Dean
College of Engineering

Date

c: Kevin Pitts
Adva Waranyuwat
Emad Jassim