Date Submitted: 12/21/21 12:57 pm

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Mechanics, **BS**

Last approved: 10/08/21 12:48 pm

Last edit: 02/15/22 10:35 am

Changes proposed by: Stephanie Ott-Monsivais

Engineering Mechanics, BS

Catalog Pages Using this Program

Proposal Type:

In Workflow

- 1. U Program Review
- 2. 1917 Head
- 3. KP Committee Chair
- 4. KP Dean
- 5. University Librarian
- 6. Provost
- 7. Senate EPC
- 8. Senate
- 9. U Senate Conf
- 10. Board of Trustees
- 11. IBHE
- 12. HLC
- 13. DMI

Approval Path

- 01/05/22 2:37 pm Deb Forgacs (dforgacs): Approved for U Program Review
- 01/05/22 5:21 pm Sanjiv Sinha (sanjiv): Approved for 1917 Head
- 3. 02/03/22 11:39 am Brooke Newell (bsnewell): Approved for KP Committee Chair
- 4. 02/03/22 11:47
 am
 Candy Deaville
 (candyd):
 Approved for KP
 Dean
- 5. 02/03/22 11:54 am John Wilkin

(jpwilkin): Approved for University Librarian 6. 02/03/22 4:15 pm Kathy Martensen (kmartens): Approved for Provost

History

- 1. Jan 15, 2019 by Stephanie Ott-Monsivais (ottmonsi)
- 2. Apr 25, 2019 by Deb Forgacs (dforgacs)
- 3. Aug 12, 2019 by Deb Forgacs (dforgacs)
- 4. Feb 26, 2020 by Brooke Newell (bsnewell)
- 5. Mar 31, 2020 by Deb Forgacs (dforgacs)
- Apr 14, 2020 by Deb Forgacs (dforgacs)
- 7. May 10, 2021 by Stephanie Ott-Monsivais (ottmonsi)
- 8. Oct 8, 2021 by Brooke Newell (bsnewell)

Major (ex. Special Education)

This proposal is for a: Revision

Administration Details

Official Program Engineering Mechanics, BS Name

Sponsor College Sponsor Department	Grainger College of Engineering Mechanical Sci & Engineering	
Sponsor Name	Stephanie Ott-Monsivais	
Sponsor Email	ottmonsi@illinois.edu	
College Contact	<u>Jonathan Makela</u> Brooke Newell	College Contact Email
<u>jmakela@illinois.ec</u>	<u>lu</u> bsnewell@illinois.edu	
College Budget Officer	<u>Tessa Hile</u>	
College Budget	tmhile@illinois.edu	

List the role for rollbacks (which role will edit the proposal on questions from EPC, e.g., Dept Head or Initiator) and/or any additional stakeholders. *Purpose: List here who will do the editing work if proposal needs rolled back. And any other stakeholders.*

Brooke Newell, bsnewell@illinois.edu, GCOE; Stephanie Ott-Monsivais, ottmonsi@illinois.edu, MechSE

Does this program have inter-departmental administration?

No

Proposal Title

Officer Email

Effective Catalog Fall 2022 Term

Provide a brief, concise description (not justification) of your proposal.

Removed Liberal Education Electives, updated number of free elective hours, and moved footnotes (when possible) into the Program of Study Table (to improve accessibility).

Removal of deactivated courses and replacement of renumbered courses is necessary to keep our program current/accurate.

List here any related proposals/revisions and their keys. *Example: This BS proposal (key 567) is related to the Concentration A proposal (key 145) and the Concentration B proposal (key 203).*

Program Justification

Why are these changes necessary?

After careful analysis of programs of studies, various requirements, and course selection for students in The Grainger College of Engineering, we have decided to provide additional flexibility to all engineering undergraduate students by increasing the number of free elective hours in all engineering programs. While the actual number of credit hours for free electives varies by program, within the college-8 programs currently provide only 6 credit hours for free electives while an additional 2 have less than 10-only 4 programs have more than 10 free elective credits. This lack of free elective credit hours limits students' abilities to efficiently pursue minors, certificates, and other educational opportunities and potentially limits those opportunities only to students coming in with significant AP credit or similar.

The additional free elective credit hours added to the program of study are obtained through the removal of The Grainger College of Engineering's Liberal Education requirement, which required engineering students to take an additional 6 credit hours above-and-beyond the campus' General Education requirement from the Humanities & the Arts, Social & Behavioral Sciences, or a college-curated list of courses. Over time, the Liberal Education requirement has been revised within the college, successively relaxing restrictions and providing additional choice to students (i.e., removal of a sequencing requirement in 1999; addition of the college-curated course list in 2010).

Simultaneously, the college-curated list of courses continued to expand to include courses from approximately 120 rubrics across campus (including within The Grainger College of Engineering), gradually removing constraints to allow greater flexibility of choice for students to take advantage of the many opportunities the campus has to offer. Still, in its current form, this additional college-level requirement constrains student choice and interferes with their ability to efficiently pursue minors, certificates, and other educational opportunities across campus unless those opportunities intersect with coursework in the Liberal Education requirement.

Simultaneously, the required engineering orientation course, ENG 100, will be granted 1-credit hour. Previously, this course was a 0-credit course. The allocation of 1-credit appropriately recognizes the time and commitment expected of all students who take this course. In the 1-credit version of ENG 100, content will be added to improve teamwork and interpersonal skills, including topics related to diversity, equity, and inclusion (DEI). The engineering accrediting agency, ABET, will soon be adding DEI requirements for accredited programs. This component of ENG 100 is therefore beneficial to all Grainger Engineering programs and students by providing a common framework on which additional DEI topics can build through out a student's program of study.

Removed deactivated course, CEE 445, from Fluid Mechanics secondary field elective option.

Replaced renumbered course, NPRE 431 replaced with NPRE 330, in the Mechanics of Materials secondary field elective option.

Will there be any reduction in other course offerings, programs or concentrations by your department as a result of this new program/proposed change?

No

Does the program include other courses/subjects impacted by the creation/revision of this program?

Yes

Required courses

Explain how the inclusion or removal of the courses/subjects listed above impacts the offering departments. The current Libe

The current Liberal Education requirement is satisfied by a student completing 6 credit hours beyond those required by campus' General Education requirement from Humanities & the Arts, Social & Behavioral Sciences, or a college-curated list of courses (containing courses from over 120 rubrics across campus). An analysis of student course selection in the Liberal Education category indicates 25% of courses are taken in the College of Liberal Arts & Sciences, 20% from the College of Applied Health Sciences, 18% from Gies College of Business, 11% from the College of Agricultural, Consumer and Environmental Sciences, 11% from the College of Fine and Applied Arts, and 9% from The Grainger College of Engineering. Less than 2% of credits are taken in each of the remaining colleges and units across campus.

Although it might stand to reason that removal of the Liberal Education requirement would reduce the amount of credits Grainger Engineering students take outside of their home college, the data do not support that assertion. Specifically, despite the current Liberal Education requirement being set at 6 credit hours, the average number of credit hours completed from the Liberal Education course list upon graduation is 11.9. Through discussions with departmental and college advisors as well as students, students are making course selections not because the course satisfies the Liberal Education requirement, but because they are interested in the coursework offered outside of their home college, are pursing minors and other educational opportunities, and are looking to balance course loads between technical and non-technical courses. Taken together, the data and evidence from advisors and students suggest that students will continue to take the types of courses represented on the Liberal Education course list, even if not specifically required to do so.

Attach letters of <u>Letters of Acknowledgement - Liberal Education Electives.pdf</u> support or acknowledgement from other departments.

Program Regulation and Assessment

Briefly describe the plan to assess and improve student learning, including the program's learning objectives; when, how, and where these learning objectives will be assessed; what metrics will be used to signify student's achievement of the stated learning objectives; and the process to ensure assessment results are used to improve student learning. (Describe how the program is aligned with or meets licensure, certification, and/or entitlement requirements, if applicable).

Data is collected and evaluated every 3 years for key curricular courses, in coordination with the faculty teaching the course in the chosen semester. Courses to be evaluated are determined by the MechSE Undergraduate Programs Committee (UPC) to be necessary to evaluate program outcomes (listed below #1. through 7.). This process allows the program to make and assess changes, advising processes, and the assessment process itself during the 6-year ABET evaluation cycle.

Each instructor (to allow for separation of lecture section results) is asked to classify the outcome attainment of all of the students in one of the five categories: Unsatisfactory (0), Marginal (1), Satisfactory (2), Mastery (3), or did not complete the assignment according to the provided rubrics. To form a metric for each program outcome, we define a performance indicator assessment ratio as the sum of the students who attained "Satisfactory (2)" and "Mastery (3)" achievement of a given performance indicator divided by the number of students who were assessed.

The UPC will evaluate all direct outcomes assessment data and discuss opportunities for improvement according to the 3-year assessment cycle. If the performance indicator assessment ratio is less than 75% for a given outcome, for a given section of a course, for a given semester then the UPC must investigate. In such cases, the UPC would first determine if further action is deemed appropriate. An example of why further action is not deemed necessary includes, but is not limited to, that the assessment ratio for one particular section of the assessed course is slightly below 75% due to small sample sizes or other explainable statistical variation in the numbers. If further action is deemed appropriate, then the UPC or a UPC appointed ad-hoc subcommittee would evaluate the assessment material, identify opportunities to improve the program if the assessment appears accurate, or improve the assessment process if the method of assessment appears lacking or inappropriate in some regard. If an improvement to either the program, assessment process or both is implemented, the performance indicator for the given outcome is reassessed and then reevaluated. If the performance indicator assessment ratios are all equal or greater than 75%, then the level of attainment is considered satisfactory and investigation is not required for the given performance indicator of the given outcome.

Program outcomes and learning objectives:

The Engineering Mechanics Program prepares graduates to achieve the following student outcomes by the time of graduation:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

3. an ability to communicate effectively with a range of audiences.

4. an ability to recognize ethical and professional responsibilities in engineering

situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts. 5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Is the career/profession for graduates of this program regulated by the State of Illinois?

No

Program of Study

"Baccalaureate degree requires at least 120 semester credit hours or 180 quarter credit hours and at least 40 semester credit hours (60 quarter credit hours) in upper division courses" (source: https://www.ibhe.org/assets/files/PrivateAdminRules2017.pdf). For proposals for new bachelor's degrees, if this minimum is not explicitly met by specifically-required 300- and/or 400-level courses, please provide information on how the upper-division hours requirement will be satisfied.

All proposals must attach the new or revised version of the Academic Catalog program of study entry. Contact your college office if you have questions.

Revised programs Engineering Mechanics, BS Side by Side.xlsx

Attach a side-by-side comparison with the existing program AND, if the revision references or adds "chose-from" lists of courses students can select from to fulfill requirements, a listing of these courses, including the course rubric, number, title, and number of credit hours.

Catalog Page Text - Overview Tab

Text for Overview tab on the Catalog Page. This is not official content, it is used to help build the new catalog page for the program. Can be edited in the catalog by the college or department.

The Engineering Mechanics program at Illinois (accredited by the Engineering Accreditation Commission of ABET, www.abet.org) is a major that focuses on the principles of mechanics that underpin design and engineering in diverse industries including materials, energy, biotechnology, civil, and aerospace to name a few. Students learn rigorous mathematical, scientific, and engineering principles in subject areas such as statics, dynamics, strength of materials, and fluid dynamics. Further, Engineering Mechanics students learn how to apply these basic principles in modern engineering design through laboratory and project work. The program also benefits from a cohesive secondary field which students can tailor to fit their academic and career objectives. Engineering Mechanics is well suited for students with an interest in analysis and design, and physical principles.

Statement for Programs of Study Catalog

Graduation Requirements

Minimum Technical GPA: 2.0

TGPA is required for required Engineering courses and any technical elective courses. See **<u>Technical GPA</u>** to clarify requirements.

Minimum Overall GPA: 2.0

Minimum hours required for graduation: 128 hours

General education: Students must complete the Campus General Education requirements including the campus general education language requirement. <u>ME 470 and TAM 324 will each satisfy a core course requirement and the Campus</u> <u>General Education Advanced Composition requirement.</u>

Specific Advanced Composition courses required for this degree are listedbelow.Orientation and Professional Development

Course List	
Code Title Hours	
ENG 100 Grainger Engineering Orientation Seminar (External transfer students take ENG 300.)1	
TAM 195 Mechanics in the Modern World 1	
ME 290 Seminar 0	
Total Hours 2	
Foundational Mathematics and Science	
Course List	
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 (MATH 220 may be substituted. MATH 220 is appropriate for students with no	4
background in calculus. 4 of 5 credit hours count towards degree.)	
MATH 231 Calculus II	3
MATH 241 Calculus III	4
MATH 257 Linear Algebra with Computational Applications	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
Engineering Mechanics Technical Core	
Course List	

Code	Title	Hours
<u>CS 101</u>	Intro Computing: Engrg & Sci ($\underline{CS 124}$ or $\underline{ECE 220}$ may be substituted.)	3

Code Title	Hours
ECE 205 Electrical and Electronic Circuits (ECE 110 and either ECE 210 or ECE 211 may be	3
substituted.)	
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 324Behavior 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

Secondary Field Option Electives

Title

Code

Course List

Hours

Secondary field electives selected from departmentally approved courses for Secondary Field Options.12 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 each are listed below. To add flexibility to the program and to accommodate particular interests, the student may fashion an individualized secondary field option. The only requirements are that the courses be related to mechanics, form a coherent and cohesive group, include at least two engineering courses, and total at least 12 hours of advanced-level coursework that are distinct from required courses in the Engineering Mechanics curriculum. This can include 500-level courses, if the student has the adequate preparation, for any of the secondary field elective courses. Each student must formally declare their choice of secondary field with a Mechanical Science and Engineering Undergraduate Programs Office advisor using a Secondary Field Options form. Biomechanics

Required Courses MCB 150 Molec & Cellular Basis of Life 4 MCB 151 Molec & Cellular Laboratory 1 **Cellular Biomechanics** <u>TAM 461</u> 4 Approved Courses ECE 473 Fund of Engrg Acoustics 3 or 4 ECE 380 3 Biomedical Imaging ME 481 Whole-Body Musculoskel Biomech 3 or 4 ME 482 Musculoskel Tissue Mechanics 3 or 4 ME 483 Mechanobiology 4 <u>BIOP 401</u> Introduction to Biophysics 3 Independent Study 1 to TAM 497 3

Code Computational Mechanics	Title	Hours
Required Courses	Numerical Methods I	3
<u>CS 557</u> MF 471	Finite Element Analysis	3 or
		4
Approved Courses		
<u>CS 450</u>	Numerical Analysis	3 or
		4
<u>CS 457</u>	Numerical Methods II	3
<u>ME 412</u>	Numerical Thermo-Fluid Mechs	2 to
		4
<u>TAM 497</u>	Independent Study	1 to
		3
Engineering Science and App Required Courses	lied Mathematics	
<u>MATH 446</u>	Applied Complex Variables	3-4
or <u>MATH 448</u>	Complex Variables	
Any 400 level MATH course, e	excluding MATH 415, MATH 441, and MATH 442	3 or
		4
Approved Courses		
<u>AE 353</u>	Aerospace Control Systems	3
<u>AE 402</u>	Orbital Mechanics	3 or
		4
<u>CEE 491</u>	Decision and Risk Analysis	3 or
		4
<u>ECE 329</u>	Fields and Waves I	3
<u>ECE 330</u>	Power Ckts & Electromechanics	3
<u>ECE 473</u>	Fund of Engrg Acoustics	3 or
	Light	4 2 or
<u>PHTS 402</u>	Light	3 OF
TAM 407	Indopendent Study	4 1 to
<u>TAM 497</u>	Independent Study	1 10
Experimental Mechanics		J
TAM 456	Experimental Stress Analysis	3
ECE 206	Electrical and Electronic Circuits Lab	1
Approved Courses		
CS 357	Numerical Methods I	3
ECE 473	Fund of Engrg Acoustics	3 or
		4
<u>ME 360</u>	Signal Processing	3.5
<u>PHYS 402</u>	Light	3 or
		4
<u>TAM 497</u>	Independent Study	1 to
		3
Fluid Mechanics		

Code	Title	Hours
	Intermediate Fluid Machanica	1
<u>IAM 455</u> ME 410	Intermediate Cas Dynamics	4 2 or
<u>ME 410</u>	Internediate Gas Dynamics	5 OF
Approved Courses		4
AE 412	Viscous Flow & Heat Transfer	4
CEE 445	Course CEE 445 Not Found	
CEE 451	Environmental Fluid Mechanics	3
 CEE 453	Urban Hydrology and Hydraulics	4
ECE 473	Fund of Engrg Acoustics	3 or
		4
<u>ME 412</u>	Numerical Thermo-Fluid Mechs	2 to
		4
<u>TAM 497</u>	Independent Study	1 to
		3
Mechanics of Materials		
Required Courses		
<u>TAM 424</u>	Mechanics of Structural Metals	3 or
		4
<u>TAM 428</u>	Mechanics of Composites	3
Approved Courses		
<u>CEE 310</u>	Transportation Engineering	3
<u>MSE 401</u>	Thermodynamics of Materials	3
<u>MSE 455</u>	Macromolecular Solids	3
<u>MSE 489</u>	Matl Select for Sustainability	3 or
		4
NPRE 431	Course NPRE 431 Not Found	
<u>NPRE 330</u>	Materials in Nuclear Engineering	<u>3</u>
<u>TAM 497</u>	Independent Study	1 to
		3
Solid Mechanics		
Required Courses		
<u>TAM 424</u>	Mechanics of Structural Metals	3 or
		4
<u>TAM 451</u>	Intermediate Solid Mechanics	4
Approved Courses		
<u>CEE 360</u>	Structural Engineering	3
<u>CEE 460</u>	Steel Structures I	3
<u>LEE 461</u>	Reinforced Concrete I	3
<u>LS 35/</u>	Numerical Methods 1	3
<u>ECE 4/3</u>	Fund of Engrg Acoustics	3 or
TAM 407	Independent Chudu	4
<u>IAM 497</u>	Independent Study	1 to
Free Electives		3
1100 LIECTIVES		

CHEM 103 requirement waived for students who received test-based credit (AP, IB, or proficiency) for CHEM 102, similarly CHEM 105 requirement waived for students who received test-based credit for CHEM 104. Students are still required to have 128 hours minimum to graduate.

3

MATH 220%7C may be substituted, with four of the five credit hours applying toward the degree. MATH 220%7C is appropriate for students with no background in calculus.
4MATH 415 may be substituted for students entering prior to Fall 2021.5
Transfer or incoming students with credit upon admission to the Engineering Mechanics program may substitute MATH 284 or MATH 285 with a grade of B + or higher.
6CS 124 or CS 125 or ECE 220 may be substituted.7
ECE 110 and ECE 210 (or ECE 211) combined may be substituted.8
Advanced Composition satisfied by completing TAM 324%7C and ME 470%7C.9
Transfers and Physics minor/dual degree students may substitute PHYS 325.10
The Grainger College of Engineering approved liberal education course list can be found here. Note that these credit hours could carry the required cultural studies designation required for campus general education requirements.
11The Grainger College of Engineering restrictions to free electives can be found here.

Code Title	Hours
The Grainger College of Engineering Liberal Education course list, or additional courses from the	6
campus General Education lists for Social and Behavioral Sciences or Humanities and the Arts 10	
Free electives. Additional unrestricted course work, subject to certain exceptions as noted by the	6
College, so that there are at least 128 credit hours earned toward the degree. 11	
Additional course work, subject to the Grainger College of Engineering restrictions to Free Electives	<u>, 11</u>
so that there are at least 128 credit hours earned toward the degree.	
Total Hours of Curriculum to Graduate	128

Course List

Corresponding BS Bachelor of Science Degree

No

Program Features

Academic Level Undergraduate

Does this major have transcripted concentrations?

What is the typical time to completion of this program?

4 years

What are the minimum Total Credit Hours required for this program?

128

CIP Code 141101 - Engineering Mechanics.

Is This a Teacher Certification Program?

Will specialized accreditation be sought for this program?

No

Delivery Method

This program is

available:

On Campus - Students are required to be on campus, they may take some online courses.

Admission Requirements

Desired Effective Fall 2021 Admissions Term

Provide a brief narrative description of the admission requirements for this program. Where relevant, include information about licensure requirements, student background checks, GRE and TOEFL scores, and admission requirements for transfer students.

Requirements will not change from previous admission requirements.

Describe how critical academic functions such as admissions and student advising are managed. No changes. Admissions to EM is still handled by Illinois Admissions and student advising is handled at the college and departmental levels.

Enrollment

Describe how this revision will impact enrollment and degrees awarded.

These changes will not impact enrollment.

Estimated Annual Number of Degrees Awarded

No

Year One Estimate

5th Year Estimate (or when fully implemented)

What is the matriculation term for this program? Fall

Budget

Are there budgetary implications for this revision?

Will the program or revision require staffing (faculty, advisors, etc.) beyond what is currently available?

No

Additional Budget Information

Attach File(s)

Financial Resources

How does the unit intend to financially support this proposal?

Will the unit need to seek campus or other external resources?

No

Attach letters of support

What tuition rate do you expect to charge for this program? e.g, Undergraduate Base Tuition, or Engineering Differential, or Social Work Online (no dollar amounts necessary)

Are you seeking a change in the tuition rate or differential for this program?

No

Resource Implications

Facilities

Will the program require new or additional facilities or significant improvements to already existing facilities?

No

Technology

Will the program need additional technology beyond what is currently available for the unit?

No

Non-Technical Resources

Will the program require additional supplies, services or equipment (non-technical)?

No

Resources

For each of these items, be sure to include in the response if the proposed new program or change will result in replacement of another program(s). If so, which program(s), what is the anticipated impact on faculty, students, and instructional resources? Please attach any letters of support/acknowledgement from faculty, students, and/or other impacted units as appropriate. Attach File(s)

Faculty Resources

Please address the impact on faculty resources including any changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc. Describe how the unit will support student advising, including job placement and/or admission to advanced studies.

These changes will not impact our faculty resources.

Library Resources

Describe your proposal's impact on the University Library's resources, collections, and services. If necessary please consult with the appropriate disciplinary specialist within the University Library.

There is no impact to the use of the Library collections, resources, and services.

EP Documentation

EP Control Number	EP.22.090
Attach Rollback/Approval Notices	ep22090 response from sponsor 20220214.pdf
This proposal requires HLC inquiry	Νο

DMI Documentation

Attach Final Approval Notices	
Banner/Codebook Name	BS:Engineering Mechanics -UIUC

HLC Approval

Program Code:	10KP0118BS			
Minor Code 0118	Conc Code	Degree Code	BS	Major Code
Senate Approval Date				
Senate Conference Approval Date				
BOT Approval Date				
IBHE Approval Date				

Date

Effective Date:

Attached Document Justification for this request

Program Reviewer Comments

Key: 121

Addition Removal Revision

Current Program of Study

General education: Students must complete the Campus General Education requirements including the campus general education language requirement. Specific Advanced Composition courses required for this degree are listed below.

Current Requirements	Current Hours				
Orientation and Professional Development	1				
ENG 100: Engineering Orientation ¹	0				
TAM 195: Mechanics in the Modern World	1				
ME 200. Sometimen	1				
ME 290: Seminar	0				
Foundational Mathematics and Science	40				
CHEM 102: General Chemistry I	3				
CHEM 103: General Chemistry Lab I ²	1				
CHEM 104: General Chemistry II	3				
CUEM 105. Cararel Chamister: Lab II ²	1				
CHEM 103: General Chemistry Lab II	1				
MATH 221: Calculus I ^o	4				
MATH 231: Calculus II	3				
	3				
MATH 241: Calculus III	4				
MATH 257: Linear Algebra with Computational Applications ⁴	3				
MATH 441: Differential Equations ⁵	3				
PHYS 211: University Physics: Mechanics	4				
PHVS 212: University Physics: Flee & Mag	4				
DIIVE 212. University Physics. Let a Mag	2				
PH I S 213: University Physics: Mechanics	2				
PHYS 214: University Physics: Elec & Mag	2				
Engineering Mechanics Technical Core	47				
CS 101: Intro Computing: Engrg & Sci ⁶	3				
ECE 205: Electrical and Electronic Circuits ⁷	3				
ECE 205. Electrical and Electronic Circuits	5				
ME 170: Computer-Aided Design	3				
ME 200: Thermodynamics	3				
	2				
ME 4/0: Senior Design Project	3				
TAM 211: Statics	3				
TAM 212: Introductory Dynamics ⁹	3				
TAM 251: Introductory Solid Mechanics	3				
TAM 252: Solid Mechanics Design	1				
TAM 270: Design for Manufacturability	3				
	3				
1 ANI 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				
	5				
	_				
Secondary Field Option Electives					
Secondary field electives selected from departmentally approved courses for Secondary Field Options. Each secondary field generally specifies two	12				
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 each are listed below. To add flexibility to the program and to accommodate particular interests, the student may fashion					
an individualized secondary field option. The only requirements are that the courses be related to mechanics, form a coherent and cohesive group.					
include at least two engineering courses and total at least 12 hours of advanced-level coursework that are distinct from required courses in the					
Enclose two engineering courses, and total at least 12 hours of advanced-level course work that are distinct from required courses in the					
Engineering Mechanics curriculum. This can include 500-level courses, if the student has the adequate preparation, for any of the secondary field					
elective courses. Each student must formally declare their choice of secondary field with a Mechanical Science and Engineering Undergraduate					
Programs Office advisor using a Secondary Field Options form.					
Biomechanics					
Biomechanics Required Courses					
Biomechanics Required Courses MCB 150: Molec & Cellular Basis of Life	4				
Biomechanics Required Courses MCB 150: Molec & Cellular Basis of Life MCR 151: Molea & Cellular Laboratory	4				
Biomechanics Required Courses MCB 150: Molec & Cellular Basis of Life MCB 151: Molec & Cellular Laboratory	4 1				
Biomechanics Required Courses MCB 150: Molec & Cellular Basis of Life MCB 151: Molec & Cellular Laboratory TAM 461: Cellular Biomechanics	4 1 4				
Biomechanics Required Courses MCB 150: Molec & Cellular Basis of Life MCB 151: Molec & Cellular Laboratory TAM 461: Cellular Biomechanics Approved Courses	4 1 4 4				
Biomechanics Required Courses MCB 150: Molec & Cellular Basis of Life MCB 151: Molec & Cellular Laboratory TAM 461: Cellular Biomechanics Approved Courses ECE 473: Fund of Engrg Acoustics	4 1 4 3 or 4				
Biomechanics Required Courses MCB 150: Molec & Cellular Basis of Life MCB 151: Molec & Cellular Laboratory TAM 461: Cellular Biomechanics Approved Courses ECE 473: Fund of Engrg Acoustics ECE 380: Biomedical Imaging	4 1 4 3 or 4 3				
Biomechanics Required Courses MCB 150: Molec & Cellular Basis of Life MCB 151: Molec & Cellular Laboratory TAM 461: Cellular Biomechanics Approved Courses ECE 473: Fund of Engrg Acoustics ECE 380: Biomedical Imaging ME 481: Whole Body Muscyleckal Piemech	4 1 4 3 or 4 3 3 or 4				
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New Program of Study

General education: Students must complete the Campus General Education requirements including the campus general education language requirement. ME 470 and TAM 324 will each satisfy a core course requirement and the Campus General Education Advanced Composition requirement.

Revised Requirements	Revised Hours	
Orientation and Professional Development	2	
ENG 100: Engineering Orientation (External transfer students take ENG 300.)	1	
TAM 195: Mechanics in the Modern World	1	
ME 290: Seminar	0	
	0	
Foundational Mathematics and Science	40	
Foundational Mathematics and Science	40	
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 (MATH 220 may be substituted. MATH 220 is appropriate for students with no	4	
background in calculus. 4 of 5 credit hours count towards degree.)		
MATH 231: Calculus II	3	
MATH 241: Calculus III	4	
MATH 257: Linear Algebra with Computational Applications	3	
MATH 441: Differential Equations	3	
PHYS 211: University Physics: Mechanics	4	
PHYS 212: University Physics: Elec & Mag	4	
PHYS 213: University Physics: Mechanics	2	
PHYS 214: University Physics: Elec & Mag	2	
	2	
Engineering Machanics Technical Core	47	
CS 101. Letra Computing. Energy & Sci (CS 124 on ECE 220 menube multituted)	4 7	
CS 101: Intro Computing: Engrg & Sci (CS 124 or ECE 220 may be substituted.)	3	
ECE 205: Electrical and Electronic Circuits (ECE 110 and either ECE 210 or ECE 211 may be	3	
substituted.) ME 170: Commuter Ailed Design	2	
ME 1/0: Computer-Alded Design	3	
	э 2	
ME 4/0: Semor Design Project	5	
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	- 1 4	
TAN 412: Internediate Dynamics	4	
1 AIVI 445: Continuum Mechanics	4	
TAM 470: Computational Mechanics	3	
Secondary Field Option Electives		
Secondary field electives selected from departmentally approved courses for Secondary Field Options.	12	
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 each are listed below. To add flexibility to the program and to accommodate particular		
interests, the student may fashion an individualized secondary field option. The only requirements are		
that the courses be related to mechanics, form a coherent and cohesive group, include at least two		
engineering courses, and total at least 12 hours of advanced-level coursework that are distinct from		
student has the adequate preparation for any of the secondary field elective courses. Each student must		
formally declare their choice of secondary field with a Mechanical Science and Engineering		
that a decide there exists a second		
Lindergraduate Programs Office advisor using a Secondary Hield Ontions form		
Undergraduate Programs Office advisor using a Secondary Field Options form.		
Biomechanics		
Biomechanics Required Courses		
Biomechanics Required Courses MCB 150: Molec & Cellular Basis of Life	4	
Biomechanics Required Courses MCB 150: Molec & Cellular Basis of Life MCB 151: Molec & Cellular Laboratory	4 1	
Biomechanics Required Courses MCB 150: Molec & Cellular Basis of Life MCB 151: Molec & Cellular Laboratory TAM 461: Cellular Biomechanics	4 1 4	
Biomechanics Required Courses MCB 150: Molec & Cellular Basis of Life MCB 151: Molec & Cellular Laboratory TAM 461: Cellular Biomechanics Approved Courses	4 1 4	
Biomechanics Required Courses MCB 150: Molec & Cellular Basis of Life MCB 151: Molec & Cellular Laboratory TAM 461: Cellular Biomechanics Approved Courses ECE 473: Fund of Engrg Acoustics	4 1 4 3 or 4	
Biomechanics Required Courses MCB 150: Molec & Cellular Basis of Life MCB 151: Molec & Cellular Laboratory TAM 461: Cellular Biomechanics Approved Courses ECE 473: Fund of Engrg Acoustics FCE 380: Biomedical Imaging	4 1 4 3 or 4	
Biomechanics Required Courses MCB 150: Molec & Cellular Basis of Life MCB 151: Molec & Cellular Laboratory TAM 461: Cellular Biomechanics Approved Courses ECE 473: Fund of Engrg Acoustics ECE 380: Biomedical Imaging ME 481: Whele Pody Musculockal Piemech	4 1 4 3 or 4 3 2 or 4	
Biomechanics Required Courses MCB 150: Molec & Cellular Basis of Life MCB 151: Molec & Cellular Laboratory TAM 461: Cellular Biomechanics Approved Courses ECE 473: Fund of Engrg Acoustics ECE 380: Biomedical Imaging ME 481: Whole-Body Musculoskel Biomech	4 1 4 3 or 4 3 3 or 4	
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Biomechanics Required Courses MCB 150: Molec & Cellular Basis of Life MCB 151: Molec & Cellular Laboratory TAM 461: Cellular Biomechanics Approved Courses ECE 473: Fund of Engrg Acoustics ECE 380: Biomedical Imaging ME 481: Whole-Body Musculoskel Biomech ME 482: Musculoskel Tissue Mechanics ME 483: Mechanobiology BIOP 401: Introduction to Biophysics	4 1 4 3 or 4 3 or 4 3 or 4 3 or 4 4 3 or 4 4 3 or 4 4 3 or 4	
Biomechanics Required Courses MCB 150: Molec & Cellular Basis of Life MCB 151: Molec & Cellular Laboratory TAM 461: Cellular Biomechanics Approved Courses ECE 473: Fund of Engrg Acoustics ECE 380: Biomedical Imaging ME 481: Whole-Body Musculoskel Biomech ME 482: Musculoskel Tissue Mechanics ME 483: Mechanobiology BIOP 401: Introduction to Biophysics TAM 497: Independent Study	4 1 4 3 or 4 3 or 4 3 or 4 3 or 4 3 or 4 4 3 or 4 1 to 3	
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Fluid Mechanics	1
Required Courses	
TAM 435: Intermediate Fluid Mechanics	4
ME 410: Intermediate Gas Dynamics	3 or 4
Approved Courses	
AE 412: Viscous Flow & Heat Transfer	4
CEE 445: Air Quality Modeling	4
CEE 451: Environmental Fluid Mechanics	3
CEE 453: Urban Hydrology and Hydraulics	4
ECE 473: Fund of Engrg Acoustics	3 or 4
ME 412: Numerical Thermo-Fluid Mechs	2 to 4
TAM 497: Independent Study	1 to 3
Mechanics of Materials	
Required Courses	
TAM 424: Mechanics of Structural Metals	3 or 4
TAM 428: Mechanics of Composites	3
Approved Courses	
CEE 310: Transportation Engineering	3
MSE 401: Thermodynamics of Materials	3
MSE 455: Macromolecular Solids	3
MSE 489: Matl Select for Sustainability	3 or 4
NPRE 431: Materials in Nuclear Engrg	3
TAM 497: Independent Study	1 to 3
Solid Mechanics	
Required Courses	
TAM 424: Mechanics of Structural Metals	3 or 4
TAM 451: Intermediate Solid Mechanics	4
Approved Courses	
CEE 360: Structural Engineering	3
CEE 460: Steel Structures I	3
CEE 461: Reinforced Concrete I	3
CS 357: Numerical Methods I	3
ECE 473: Fund of Engrg Acoustics	3 or 4
TAM 497: Independent Study	1 to 3
Electives	
The Grainger College of Engineering Liberal Education course list, or additional courses from the campus General Education lists for Social and Behavioral Sciences or Humanities and the Arts ¹⁰	6
Free electives. Additional unrestricted course work, subject to certain exceptions as noted by the College, so that there are at least 128 credit hours	6
earned toward the degree. ¹¹	
Total Hours of Curriculum to Graduate	128
Footnotes	
¹ External transfer students take ENG 300 instead	
² CHEM 103 requirement waived for students who received test based credit (AP_IR_or proficiency) for CHEM 102, similarly CHEM 105	
requirement wavied for students who received test-based credit for CHEM 104. Students are still required to have 128 hours minimum to graduate	
³ WITH 220 mm have been being and the form of the form multime terms of the denses MITH 220 is more might for students with me	

Fluid Mechanics	
Required Courses	
TAM 435: Intermediate Fluid Mechanics	4
ME 410: Intermediate Gas Dynamics	3 or 4
Approved Courses	
AE 412: Viscous Flow & Heat Transfer	4
CEE 451: Environmental Fluid Mechanics	3
CEE 453: Urban Hydrology and Hydraulics	4
ECE 473: Fund of Engrg Acoustics	3 or 4
ME 412: Numerical Thermo-Fluid Mechs	2 to 4
TAM 497: Independent Study	1 to 3
Mechanics of Materials	
Required Courses	
TAM 424: Mechanics of Structural Metals	3 or 4
TAM 428: Mechanics of Composites	3
Approved Courses	
CEE 310: Transportation Engineering	3
MSE 401: Thermodynamics of Materials	3
MSE 455: Macromolecular Solids	3
MSE 489: Matl Select for Sustainability	3 or 4
NPRE 330: Materials in Nuclear Engrg	3
ΓAM 497: Independent Study	1 to 3
Solid Mechanics	
Required Courses	
TAM 424: Mechanics of Structural Metals	3 or 4
TAM 451: Intermediate Solid Mechanics	4
Approved Courses	
CEE 360: Structural Engineering	3
CEE 460: Steel Structures I	3
CEE 461: Reinforced Concrete I	3
CS 357: Numerical Methods I	3
ECE 473: Fund of Engrg Acoustics	3 or 4
TAM 497: Independent Study	1 to 3
Free Electives	
Additional course work subject to the Grainger College of Engineering restrictions to Free Electives so that	11
here are at least 128 credit hours earned toward the degree. (https://go.grainger.illinois.edu/FreeElectives)	
Fotal Hours of Curriculum to Graduate	128
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MATH 220 may be substituted, with jour of the five creati nours applying loward the degree. MATH 220 is appropriate for students with no			
background in calculus.			
⁴ MATH 415 may be substituted for students entering prior to fall 2022.			
⁵ Transfer or incoming students with credit upon admission to the Engineering Mechanics program may substitute MATH 284 or MATH 285 with a			
grade of B+ or higher.			
⁶ CS 124 or CS 125 or ECE 220 may be substituted.			
⁷ ECE 110 and ECE 210 (or ECE 211) combined may be substituted.			
⁸ Advanced Composition satisfied by completing TAM 324 and ME 470.			
⁹ Transfers and Physics minor/dual degree students may substitute PHYS 325.			
¹⁰ The Grainger College of Engineering approved liberal education course list can be found here. Note that these credit hours could carry the			
required cultural studies designation required for campus general education requirements.			
¹¹ The Christen College of Engineering restrictions to free destines can be found have		1	



COLLEGE OF AGRICULTURAL, CONSUMER & ENVIRONMENTAL SCIENCES

Office of the Dean 227 Mumford Hall, MC-710 1301 W. Gregory Drive Urbana, IL 61801

January 13, 2022

Dear Dean Bashir,

Thank you for informing us of the proposed removal of the Liberal Education requirements in all undergraduate programs in The Grainger College of Engineering. I understand that this requirement included an extensive list of courses Grainger Engineering students could choose from, including some from our college. Grainger Engineering students will continue to be welcome to enroll in the courses formerly on your Liberal Education list as Free Electives after the removal of this requirement.

Germán Bollero, Interim Dean



COLLEGE OF APPLIED HEALTH SCIENCES

Office of the Dean 110 Huff Hall, MC-586 1206 S. Fourth St. Champaign, IL 61820

January 25, 2022

Dear Dean Bashir,

Thank you for informing us of the proposed removal of the Liberal Education requirements in all undergraduate programs in The Grainger College of Engineering. I understand that this requirement included an extensive list of courses Grainger Engineering students could choose from, including some from our college. Grainger Engineering students will continue to be welcome to enroll in the courses formerly on your Liberal Education list as Free Electives after the removal of this requirement.

While I support the move the give your students more freedom in course selection, it is important to express my concern that discontinuing your Liberal Education requirement may negatively impact my college's finances by reducing the IUs generated from lower enrollments in AHS courses. As you know, the current budget model rewards colleges financially based on the number of registrants in courses. I am hopeful that your students and advisors will continue to view AHS courses as relevant and valuable when they are selecting electives.

Sincerely,

Chery Hanley - Maxwell

Dean



College of Education

Undergraduate Student Academic Affairs Office 110 Education Building, MC-708 1310 S. Sixth St. Champaign, IL 61820

Dear Dean Bashir,

Thank you for informing us of the proposed removal of the Liberal Education requirements in all undergraduate programs in The Grainger College of Engineering. I understand that this requirement included an extensive list of courses Grainger Engineering students could choose from, including some from our college. Grainger Engineering students will continue to be welcome to enroll in the courses formerly on your Liberal Education list as Free Electives after the removal of this requirement.

Assistant Dean for Academic Affairs College of Education | University of Illinois at Urbana-Champaign



College of Fine & Applied Arts

Office of the Dean 100 Architecture Building, MC-622 608 E. Lorado Taft Dr. Champaign, IL 61820

21 December 2021

Rashid Bashir, Dean 306 Engineering Hall 1308 W. Green St. M/C 266 Urbana, IL 61801

Dear Dean Bashir,

Thank you for informing us of the proposed removal of the Liberal Education requirements in all undergraduate programs in The Grainger College of Engineering. I understand that this requirement included an extensive list of courses Grainger Engineering students could choose from, including some from the College of Fine & Applied Arts. Grainger Engineering students will continue to be welcome to enroll in the courses formerly on your Liberal Education list as Free Electives after the removal of this requirement.

Kevin Hamiltan

Kevin Hamilton Dean and Professor



2090 Lincoln Hall, MC-448 702 S. Wright St. Urbana, IL 61801

December 20, 2021

Dear Dean Bashir,

Thank you for informing the College of LAS of the proposed removal of the Liberal Education requirement in all undergraduate programs in the Grainger College of Engineering. I understand that this requirement includes an extensive list of courses from which your students could choose some, many of which are from our college. Grainger Engineering students will continue to be welcome to take our courses formerly on your Liberal Education list as free electives after the removal of this requirement from their programs of study.

metrie Rollin

Venetria K. Patton Harry E. Preble Dean



College of Media

Office of the Dean 119 Gregory Hall, MC-462 810 S. Wright St. Urbana, IL 61801

January 13, 2022

Rashid Bashir, Dean The Grainger College of Engineering 306 Engineering Hall 1308 W. Green Street Urbana, IL 61801

Dear Dean Bashir,

Thank you for informing us of the proposed removal of the Liberal Education requirements in all undergraduate programs in The Grainger College of Engineering. I understand that this requirement included an extensive list of courses Grainger Engineering students could choose from, including some from our college. Grainger Engineering students will continue to be welcome to enroll in the courses formerly on your Liberal Education list as Free Electives after the removal of this requirement.

Shary huk

Tracy Sulkin Dean, College of Media



December 13th, 2021

Dean Bashir,

Thank you for informing us of the proposed removal of the Liberal Education requirements in all undergraduate programs in The Grainger College of Engineering. I understand that this requirement included an extensive list of courses Grainger Engineering students could choose from, including some from Gies College of Business. Students from Grainger will continue to be welcome to enroll in the courses formerly on your Liberal Education list as Free Electives after the removal of this requirement.

Jeffrey R. Brown Dean, Gies College of Business



501 E. Daniel St., MC-493 Champaign, IL 61820-6211

February 3, 2022

Dean Rashid Bashir 306 Engineering Hall 1308 West Green Street Urbana, IL 61801

Dear Rashid,

Thank you for informing us of the proposed removal of the Liberal Education requirements in all undergraduate programs in the Grainger College of Engineering. I understand that this requirement included an extensive list of courses that Grainger Engineering students could choose from, including some from the iSchool. This letter acknowledges that Grainger Engineering students will continue to be able to enroll in courses as articulated and constrained in Course Explorer and formerly on your Liberal Education list as Free Electives, after the removal of this requirement.

Eunice Santos

Eunice Santos Professor and Dean

From: Hanley-Maxwell, Cheryl D <<u>cherylhm@illinois.edu</u>>
Sent: Monday, February 14, 2022 3:57 PM
To: Miller, Nolan H <<u>nmiller@illinois.edu</u>>
Subject: RE: Senate Ed Pol - Re: change to Grainger Liberal Education requirement

That's fine. Thanks for asking

CHERYL D HANLEY-MAXWELL

Dean

University of Illinois at Urbana-Champaign College of Applied Health Sciences 108 Huff Hall 1206 S Fourth | M/C 586 Champaign, IL 61820 217.333.2131 | <u>cherylhm@illinois.edu</u> www.ahs.illinois.edu (217) 333-0404 (FAX)

Human kindness has never weakened the stamina or softened the fiber of a free people. A nation does not have to be cruel to be tough. -- President Franklin D. Roosevelt



Under the Illinois Freedom of Information Act any written communication to or from university employees regarding university business is a public record and may be subject to public disclosure.

From: Miller, Nolan H <<u>nmiller@illinois.edu</u>>
Sent: Monday, February 14, 2022 1:49 PM
To: Hanley-Maxwell, Cheryl D <<u>cherylhm@illinois.edu</u>>
Subject: RE: Senate Ed Pol - Re: change to Grainger Liberal Education requirement

Dear Cheryl,

Thanks again for talking with me about the changes to the Grainger BS programs. I read the statement you sent to the committee today. The Chair would like to include it in the record that is forwarded to the Senate. Is it ok to include the email you sent below?

Thanks,

Nolan



NOLAN H MILLER

Daniel and Cynthia Mah Helle Professor in Finance | Department of Finance Director, Center for Business and Public Policy Gies College of Business | University of Illinois at Urbana-Champaign 217.244.2847 | nmiller@illinois.edu | http://www.business.illinois.edu/nmiller

Under the Illinois Freedom of Information Act any written communication to or from university employees regarding university business is a public record and may be subject to public disclosure.

From: Hanley-Maxwell, Cheryl D <<u>cherylhm@illinois.edu</u>>
Sent: Thursday, February 10, 2022 1:49 PM
To: Miller, Nolan H <<u>nmiller@illinois.edu</u>>
Subject: RE: Senate Ed Pol - Re: change to Grainger Liberal Education requirement

Hi Nolan –

I appreciate what Ed Pol does in juggling the interests and concerns of the various programs across the campus, while keeping the students in mind. I served on a committee like this at my previous institution and know that it all boils down to what is best for the students' learning. Thanks for reminding me of that.

Here is a statement: While the Grainger proposal has the potential to financially affect AHS, we want to affirm another college's right to control their program requirements and student experiences, ensuring the best possible outcomes for their students. As a result, AHS supports this proposal and hopes that Grainger advisors will recognize the valuable contribution AHS classes make to the education of their students and continue to encourage them to consider relevant and/or high interest classes in AHS.

Hope this works!

Cheryl

CHERYL D HANLEY-MAXWELL, PHD Dean

University of Illinois at Urbana-Champaign College of Applied Health Sciences 108 Huff Hall 1206 S Fourth | M/C 586 Champaign, IL 61820 217.333.2131 | <u>cherylhm@illinois.edu</u> www.ahs.illinois.edu (217) 333-0404 (FAX)

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