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Changes proposed by: Elaine Schulte

Catalog Pages Using this Program	Physics, BS

Proposal Type:

In Workflow

1. **U Program Review**
2. **1244 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

1. 01/05/22 2:45 pm
   Deb Forgacs (dforgacs):
   Approved for U Program Review
2. 01/05/22 2:46 pm
   S. Lance Cooper (slcooper):
   Approved for 1244 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 11:56 am

John Wilkin (jpwilkin): Approved for University Librarian
6. 02/03/22 4:16 pm Kathy Martensen (kmartens): Approved for Provost

History

1. Jan 17, 2019 by Deb Forgacs (dforgacs)
2. Apr 4, 2019 by Deb Forgacs (dforgacs)
3. Apr 6, 2019 by Deb Forgacs (dforgacs)
4. Apr 11, 2019 by Deb Forgacs (dforgacs)
5. Apr 23, 2019 by Deb Forgacs (dforgacs)
6. Aug 12, 2019 by Deb Forgacs (dforgacs)
7. Feb 26, 2020 by Brooke Newell (bsnewell)
8. Mar 31, 2020 by Deb Forgacs (dforgacs)
9. Oct 22, 2021 by Brian DeMarco (bdemarco)
10. Oct 25, 2021 by Brooke Newell (bsnewell)

Major (ex. Special Education)

This proposal is for a:

Revision

Administration Details

Official Program Name	Physics, BS
Sponsor College	Grainger College of Engineering
Sponsor Department	Physics
Sponsor Name	Yann Chemla ~~Brian DeMarco~~
Sponsor Email	ychemla@illinois.edu ~~bdemarco@illinois.edu~~
College Contact	Jonathan Makela
College Contact Email	jmakela@illinois.edu
College Budget Officer	Tessa Hile
College Budget Officer Email	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, GCOE; Elaine Schulte, PHYS

Does this program have inter-departmental administration?

No

Proposal Title

Effective Catalog Term	Fall 2022

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

This update does not change the total hours needed for degree. The following actions are taken in this proposed revision:

**Removed Liberal Education Electives, updated number of free elective hours, and moved footnotes(when possible) into the Program of Study Table (to improve accessibility).
**Reorganize course tables for clarity to address common student confusion.
**Added required MATH 257 as replacement for MATH 415, which is being phased out by MATH.
**Rename elective options for clarity and to reduce student confusion.
**Remove math electives list because of redundancy.
**Clean up "tech elective" list for brevity and clarity.
**Removed 7 under utilized tracks (Acoustical Physics, Atmospheric Science, BioPhysics, Electrical and Computer Engineering, Energy/Sustainability, Materials Science, Optical Physics, Law)
**Added in new and proposed elective physics courses.
**Verified graduate vs undergraduate hours for courses with dual-hours and kept only undergraduate hours. This clarifies the hours required on the course listing tables.

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?

With the consolidation of our programs entirely into the Grainger College of Engineering, we need to ensure that the program is up-to-date, and correctly and clearly reflects all educational options available to our students.

We are re-naming the Technical Elective Options to Program Tracks to prevent student confusion and to simplify the number of options presented to students. The tracks removed from the public list are the tracks/elective combinations students rarely select in practice. The ones that are kept on the public list are the most commonly selected. To foster student development and creativity, students are welcome to develop a track tailored to their interests with the help of the physics advisor.

We have removed the separated list of Flexible Physics Core Electives and incorporating them under each Program Track. This is intended to simplify the accounting of credit hours for each Program Track.

We are removing the math list at 300 & 400 level. We are making this change for the following reasons:

1) Students' math requirements are completely met with the enforced requirement that MATH 257 be credit for, or concurrent enrollment in, for PHYS 435.
2) With the above change, along with pre-requisite enforcement during registration, students now have 5 required math classes for not less than 18 hours. This is consistent with the total number of mathematics hours in the previous sequence.
3) The math list included the entire MATH catalog at 300 and 400 level. This is entirely redundant and subject to error as MATH updates its catalog of courses on offer.
4) We are updating the sequence to reflect the fact that MATH 415 is being replaced by MATH 257. MATH 257 is now a required component of the curriculum, rather than the option that MATH 415 had been.
5) Requiring MATH 257 improves student preparation for the physics courses at the advanced level.
6) All students are welcome to take more MATH according to their interests.
7) Suitable substitutions to the MATH sequence can be made in consultation with the Physics advisor, as needed.

A review of the previous free-elective hours range (13 to 37) was completed. We found that these free-elective values (13 to 37) were in long-standing error. We were not able to determine origin of the error. This error has been corrected with the new free-elective hours (31 to 43, including the 5 free-elective hours from the now discontinued Grainger College of Engineering Liberal Education requirement).

All of these changes are intended to reduce student confusion, redundancy, and error. None of them impact overall credit hours.

Grainger College of Engineering Liberal Elective Changes:

After careful analysis of programs of studies, various requirements, and course selection for students inThe 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 throughout a student's program of study.

Instructional Resources

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

MATH 257 - Linear Algebra w Computat Appl

CS 124 - Intro to Computer Science I

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

MATH 257 is the replacement course for the soon-to-be phased down MATH 415. MATH 415 was a course already on the course listing in the program. All students will now be required to take MATH 257 as a pre-requisite for PHYS 435, a required course in the sequence.

CS 124 is the replacement for the soon-to-be phased down CS 125. CS 125 is an option we have taken in lieu of CS 101, a required course. This change reflects our current practice for helping students meet degree requirements.

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 support or acknowledgement from other departments.

Physics_letter_Math_257.pdf
CS_124_Letter of Support_Physics signed tp.pdf
Letters of Acknowledgement - Liberal Education Electives.pdf

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).

The current plan for program regulation and assessment will continue without changes under this proposal.

The Department of Physics Undergraduate Studies Office—together with guidance from the Undergraduate Studies Committee—will work to collect, compile, evaluate, and report on the learning outcomes for each course. This work will include, but not be limited to:

Informal Early Feedback:

Students in each major-specific course will be invited to participate in a survey to help the department and instructors evaluate the students' understanding of the course learning objectives, outcomes, and course goals. Summary reports will be made available to instructors and the department leadership.

Evaluation of Direct Student Learning:

Final examinations (i.e., questions and student work) will be collected for evaluation of learning outcomes. This will include evaluation of the assessments' usefulness in evaluation of learning outcomes, as well as the mastery of the outcomes by students. Anonymized student work will be used for the evaluation. Summary reports will be made available to instructors and the Department leadership.

Indirect Evaluation of Student Learning:

Indirect measures of student learning will include current enrollment, including demographic information.

Degree completion rates, including information regarding:

Semesters to completion
Degree program requirements
Semesters to complete specified intra-degree program requirements
Choke-points in degree completion progression
Course updates and revisions
Desirable new courses
Demographic trends

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 Physics, 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.

Statement for Programs of Study Catalog

Graduation Requirements

Minimum Technical GPA: 2.0

TGPA is required for Math and Physics courses. See **Technical GPA** 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.

Orientation and Professional Development

Course List

Code	Title	Hours
ENG 100	Grainger Engineering Orientation Seminar (External transfer students take ENG 300.)	1
PHYS 110	Physics Careers	0
Total Hours		1

Foundational Mathematics and Science

Course List

Code	Title	Hours
MATH 221	Calculus I (MATH 220 may be substituted. MATH 220 is appropriate for students with no	4

Code	Title	Hours
	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 285	Intro Differential Equations (May be replaced by both MATH 441 and MATH 442.)	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
CHEM 102	General Chemistry I	3
CHEM 103	General Chemistry Lab I	1
CS 101	Intro Computing: Engrg & Sci	3
or CS 124	Introduction to Computer Science I	
Total Hours		36

Physics Technical Core

Course List

Code	Title	Hours
PHYS 225	Relativity & Math Applications	2
PHYS 325	Classical Mechanics I	3
PHYS 435	Electromagnetic Fields I	3
PHYS 486	Quantum Physics I (PHYS 485 may be substituted.)	4
Total Hours		12

Program Tracks

Course List

Code	Title	Hours
~~Technical/professional option electives for the option selected, chosen from a departmentally approved list of Technical/Professional Option Electives (or a list designed for a departmentally approved custom option) below. The number of hours varies depending upon the option chosen.~~		~~12-22~~
~~Acoustical Physics~~		
~~ECE 210~~	~~Analog Signal Processing~~	~~4~~
~~ECE 473~~	~~Fund of Engrg Acoustics~~	~~3 or 4~~
Students are required to complete one track. Tracks may be selected from one of the departmentally approved lists below. Students may devise an alternative, custom track with a set of courses approved by the department.		20-32
Astrophysics Track		25-27
ASTR 210	Introduction to Astrophysics	3
ASTR 350	The Big Bang, Black Holes, and the End of the Universe	3
or ASTR 406	Galaxies and the Universe	
ASTR 404	Stellar Astrophysics	3
ASTR 405	Planetary Systems	3
ASTR 414	Astronomical Techniques	4
~~Atmospheric Science~~		
~~ATMS 201~~	~~General Physical Meteorology~~	~~3~~
Choose a minimum of 6 hours of courses from the Flexible Physics Core Electives List:		6
PHYS 246	Physics on the Silicon Prairie: An Introduction to Modern Computational Physics	2
PHYS 326	Classical Mechanics II	3

Code	Title	Hours
PHYS 370	Introduction to Quantum Information and Computing	3
PHYS 427	Thermal & Statistical Physics	4
PHYS 436	Electromagnetic Fields II	3
PHYS 446	Modern Computational Physics	3
PHYS 460	Condensed Matter Physics	4
PHYS 470	Subatomic Physics	4
PHYS 487	Quantum Physics II	4
Choose 1 course from the Physics Lab Electives List:		3
PHYS 371	Course PHYS 371 Not Found	3
PHYS 401	Classical Physics Lab	3
PHYS 402	Light	4
~~Astrophysics~~		
PHYS 403	Modern Experimental Physics	5
PHYS 404	Electronic Circuits	5
~~Energy/Sustainability~~		
~~ATMS 201~~	~~General Physical Meteorology~~	~~3~~
~~ATMS 302~~	~~Atmospheric Dynamics I~~	~~3~~
~~ECE 205~~	~~Electrical and Electronic Circuits~~	~~3~~
~~ENG 471~~	~~Seminar Energy & Sustain Engrg~~	~~1~~
~~NRES 210~~	~~Environmental Economics~~	~~3~~
~~Choose 1 class from the following:~~		
~~ECE 333~~	~~Green Electric Energy~~	~~3~~
Business Track		30-32
ENG 471	Seminar Energy & Sustain Engrg	1
IE 420	Financial Engineering	3
SE 400	Engineering Law	3
TE 100	Introduction to Innovation, Leadership and Engineering Entrepreneurship	1
TE 360	Lectures in Engineering Entrepreneurship	1
TE 333	Creativity, Innovation, Vision	4
TE 461	Technology Entrepreneurship	3
TE 450	Startups: Incorporation, Funding, Contracts, & Intellectual Property	3
TE 466	High-Tech Venture Marketing	2
~~Computational Physics~~		
Choose a minimum of 6 hours of courses from the Flexible Physics Core Electives List:		6
PHYS 246	Physics on the Silicon Prairie: An Introduction to Modern Computational Physics	2
PHYS 326	Classical Mechanics II	3
PHYS 370	Introduction to Quantum Information and Computing	3
PHYS 427	Thermal & Statistical Physics	4
PHYS 436	Electromagnetic Fields II	3
PHYS 446	Modern Computational Physics	3
PHYS 460	Condensed Matter Physics	4
PHYS 470	Subatomic Physics	4
PHYS 487	Quantum Physics II	4
Choose 1 course from the Physics Lab Electives List:		3
PHYS 371	Course PHYS 371 Not Found	3
PHYS 401	Classical Physics Lab	3
PHYS 402	Light	4

Code	Title	Hours
PHYS 403	Modern Experimental Physics	5
PHYS 404	Electronic Circuits	5
Computational Physics Track		24-27
CS 173	Discrete Structures	3
or MATH 213	Basic Discrete Mathematics	
CS 225	Data Structures	4
Choose 3 classes from the following:		
CS 357	Numerical Methods I	3
CS 420	Parallel Progrmg: Sci & Engrg	3
CS 418	Interactive Computer Graphics	3
CS 450	Numerical Analysis	3
~~PHYS 298~~	~~Freshmen/Sophomore Special Topics in Physics (Computational Physics)~~	~~2~~
~~PHYS 498~~	~~Special Topics in Physics (Computation in Physics)~~	~~3~~
~~Electrical and Computer Engineering~~		
~~ECE 110~~	~~Introduction to Electronics (OR ECE 205: Electrical and Electronic Circuits)~~	~~3~~
~~ECE 120~~	~~Introduction to Computing~~	~~4~~
~~ECE 210~~	~~Analog Signal Processing~~	~~4~~
PHYS 246	Physics on the Silicon Prairie: An Introduction to Modern Computational Physics	2
PHYS 446	Modern Computational Physics (Modern Computational Physics)	3
Choose a minimum of 6 hours of courses from the Flexible Physics Core Electives List:		
~~ATMS 301~~	~~Atmospheric Thermodynamics~~	~~3~~
~~ATMS 302~~	~~Atmospheric Dynamics I~~	~~3~~
~~ATMS 304~~	~~Radiative Transfer-Remote Sens~~	~~3~~
~~ATMS 305~~	~~Computing and Data Analysis~~	~~3~~
~~ATMS 306~~	~~Cloud Physics~~	~~3~~
~~ATMS 314~~	~~Mesoscale Dynamics~~	~~3~~
~~ATMS 405~~	~~Boundary Layer Processes~~	~~4~~
~~BioPhysics~~		
~~CHEM 104~~	~~General Chemistry II (OR CHEM 204)~~	~~3~~
~~CHEM 105~~	~~General Chemistry Lab II (OR CHEM 205)~~	~~1~~
~~CHEM 232~~	~~Elementary Organic Chemistry I (OR CHEM 236)~~	~~3 or 4~~
~~CHEM 233~~	~~Elementary Organic Chem Lab I~~	~~2~~
PHYS 326	Classical Mechanics II	3
PHYS 370	Introduction to Quantum Information and Computing	3
PHYS 427	Thermal & Statistical Physics	4
PHYS 436	Electromagnetic Fields II	3
PHYS 460	Condensed Matter Physics	4
PHYS 470	Subatomic Physics	4
PHYS 487	Quantum Physics II	4
Choose 1 course from the Physics Lab Electives List:		3
PHYS 371	Course PHYS 371 Not Found	
PHYS 401	Classical Physics Lab	3
PHYS 402	Light	4
PHYS 403	Modern Experimental Physics	5
PHYS 404	Electronic Circuits	5
~~Solid State Electronics~~		

Code	Title	Hours
~~ECE 110~~	~~Introduction to Electronics~~	~~3~~
~~ECE 444~~	~~IC Device Theory & Fabrication~~	~~4~~
Nuclear Physics Track		22-25
NPRE 402	Nuclear Power Engineering	3
~~NPRE 412~~	~~Nuclear Power Econ & Fuel Mgmt~~	~~3 or 4~~
~~NPRE 470~~	~~Fuel Cells & Hydrogen Sources~~	~~3~~
~~NPRE 475~~	~~Wind Power Systems~~	~~3 or 4~~
~~Materials Science~~		
~~MSE 206~~	~~Mechanics for MatSE~~	~~4~~
~~MSE 280~~	~~Engineering Materials~~	~~3~~
~~MSE 401~~	~~Thermodynamics of Materials (OR PHYS 427: Thermal & Statistical Physics)~~	~~3~~
~~Choose 1 class from the following:~~		
~~MSE 304~~	~~Electronic Properties of Matls~~	~~3~~
~~MSE 402~~	~~Kinetic Processes in Materials~~	~~3~~
~~MSE 403~~	~~Synthesis of Materials~~	~~3~~
~~MSE 405~~	~~Microstructure Determination~~	~~3~~
~~MSE 406~~	~~Thermal-Mech Behavior of Matls~~	~~3~~
~~Nuclear Physics~~		
~~NPRE 402~~	~~Nuclear Power Engineering~~	~~3 or 4~~
PHYS 470	Subatomic Physics	4
~~Choose 2 classes from the following:~~		
Choose 2 classes from the following:		
~~ECE 310~~	~~Digital Signal Processing~~	~~3~~
~~ECE 417~~	~~Multimedia Signal Processing~~	~~4~~
~~ECE 473~~	~~Fund of Engrg Acoustics~~	~~3~~
~~ECE 402~~	~~Electronic Music Synthesis~~	~~3~~
NPRE 435	Radiological Imaging	3
NPRE 441	Radiation Protection	4
NPRE 446	Radiation Interact w/Matter I	3
~~Optical Physics~~		
~~ECE 455~~	~~Optical Electronics~~	~~3 or 4~~
~~ECE 460~~	~~Optical Imaging~~	~~4~~
~~ECE 465~~	~~Optical Communications Systems~~	~~3~~
~~Choose 1 class from the following:~~		
Choose a minimum of 6 hours of courses from the Flexible Physics Core Electives List:		
~~BIOP 401~~	~~Introduction to Biophysics~~	~~3~~
~~MCB 450~~	~~Introductory Biochemistry (OR MCB 354: Biochemistry and Physical Basis of Life)~~	~~3~~
~~PHYS 498~~	~~Special Topics in Physics (Quantiative Biology)~~	~~4~~
~~Business~~		
PHYS 246	Physics on the Silicon Prairie: An Introduction to Modern Computational Physics	2
PHYS 326	Classical Mechanics II	3
PHYS 370	Introduction to Quantum Information and Computing	3
PHYS 427	Thermal & Statistical Physics	4

Code	Title	Hours
PHYS 436	Electromagnetic Fields II	3
PHYS 446	Modern Computational Physics	3
PHYS 460	Condensed Matter Physics	4
PHYS 487	Quantum Physics II	4
Choose 1 course from the Physics Lab Electives List:		
~~ECE 310~~	~~Digital Signal Processing~~	~~3~~
~~ECE 330~~	~~Power Ckts & Electromechanics~~	~~3~~
~~ECE 385~~	~~Digital Systems Laboratory~~	~~3~~
PHYS 371	Course PHYS 371 Not Found	3
PHYS 401	Classical Physics Lab	3
PHYS 402	Light	4
PHYS 403	Modern Experimental Physics	5
PHYS 404	Electronic Circuits	5
Graduate Study Track		20-24
Take the following four courses from the Flexible Physics Core Electives List:		14
PHYS 326	Classical Mechanics II	3
PHYS 427	Thermal & Statistical Physics	4
PHYS 436	Electromagnetic Fields II	3
~~Law~~		
~~CMN 211~~	~~Business and Professional Communication~~	~~3~~
~~JOUR 200~~	~~Introduction to Journalism~~	~~3~~
~~LAW 301~~	~~Introduction to Law~~	~~2 or 3~~
~~Choose 2 classes from the following:~~		
~~ESE 320~~	~~Water Planet, Water Crisis~~	~~3~~
~~NPRE 480~~	~~Energy and Security~~	~~3~~
~~PS 225~~	~~Environmental Politics & Policy~~	~~3~~
~~PS 273~~	~~Environment and Society~~	~~3~~
~~SE 400~~	~~Engineering Law~~	~~3 or 4~~
~~Professional Option~~		
~~MATH 415~~	~~Applied Linear Algebra~~	~~3 or 4~~
PHYS 487	Quantum Physics II	4
~~Choose 1 lab from the following (cannot count toward Flexible Physics Core):~~		
Choose two labs from Physics Lab Electives List:		6-10
PHYS 371	Course PHYS 371 Not Found	3
PHYS 401	Classical Physics Lab	3
PHYS 402	Light	4
PHYS 403	Modern Experimental Physics	5
PHYS 404	Electronic Circuits	5

Free ~~Flexible Physics Core~~ Electives

Course List		
Code	Title	Hours
~~Free 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 5~~		~~6~~

Code	Title	Hours
~~Free electives. Additional unrestricted course work, subject to certain exceptions as noted by the College, so that there are at least 128 credit hours earned toward the degree. The number of hours varies depending upon the total hours earned in both the Flexible Physics Core and the Technical/Professional Option and whether or not MATH 415 and PHYS 486 are taken in place of PHYS 485. 6~~		~~13-37~~
Additional course work,subject to the Grainger College of Engineering restrictions to Free Electives, so that there are at least 128 credit hours earned toward the degree. The number of free elective hours varies depending upon the total hours earned in Flexible Physics Electives, Physics Lab Electives, and Program Track.		31-43
Total Hours of Curriculum to Graduate		128

~~Course List~~

~~Code~~	~~Title~~	~~Hours~~
~~Flexible physics core electives. Choose three courses from a departmentally approved list below, with at least one being a lab course (PHYS 401, PHYS 402, PHYS 403, PHYS 404, or PHYS 406). The number of hours varies depending upon the courses chosen.~~		~~9-15~~
~~PHYS 326~~	~~Classical Mechanics II~~	~~3~~
~~PHYS 401~~	~~Classical Physics Lab~~	~~3~~
~~PHYS 402~~	~~Light~~	~~3 or 4~~
~~PHYS 403~~	~~Modern Experimental Physics~~	~~4 or 5~~
~~PHYS 404~~	~~Electronic Circuits~~	~~4 or 5~~
~~PHYS 406~~	~~Acoustical Physics of Music~~	~~4~~
~~PHYS 427~~	~~Thermal & Statistical Physics~~	~~4~~
~~PHYS 436~~	~~Electromagnetic Fields II~~	~~3~~
~~PHYS 460~~	~~Condensed Matter Physics~~	~~4~~
~~PHYS 470~~	~~Subatomic Physics~~	~~4~~
~~PHYS 475~~	~~Introduction to Biophysics~~	~~3 or 4~~
~~PHYS 487~~	~~Quantum Physics II~~	~~4~~
~~Mathematics Elective~~		

~~Course List~~

~~Code~~	~~Title~~	~~Hours~~
~~Mathematics elective, chosen from a departmentally approved list below:~~		~~3~~
~~CS 357~~	~~Numerical Methods I~~	~~3~~
~~CS 450~~	~~Numerical Analysis~~	~~3 or 4~~
~~MATH 415~~	~~Applied Linear Algebra~~	~~3 or 4~~
~~MATH 417~~	~~Intro to Abstract Algebra~~	~~3 or 4~~
~~MATH 453~~	~~Number Theory~~	~~3 or 4~~
~~MATH 412~~	~~Graph Theory~~	~~3 or 4~~
~~MATH 413~~	~~Intro to Combinatorics~~	~~3 or 4~~
~~MATH 414~~	~~Mathematical Logic~~	~~3 or 4~~
~~MATH 482~~	~~Linear Programming~~	~~3 or 4~~
~~MATH 347~~	~~Fundamental Mathematics~~	~~3~~
~~MATH 348~~	~~Fundamental Mathematics-ACP~~	~~4~~
~~MATH 424~~	~~Honors Real Analysis~~	~~3~~

Code	Title	Hours
MATH 441	Differential Equations	3 or 4
MATH 442	Intro Partial Diff Equations	3 or 4
MATH 444	Elementary Real Analysis	3 or 4
MATH 446	Applied Complex Variables	3 or 4
MATH 447	Real Variables	3 or 4
MATH 484	Nonlinear Programming	3 or 4
MATH 489	Dynamics & Differential Eqns	3 or 4
MATH 402	Non Euclidean Geometry	3 or 4
MATH 403	Euclidean Geometry	3 or 4
MATH 423	Differential Geometry	3 or 4
MATH 432	Set Theory and Topology	3 or 4
MATH 481	Vector and Tensor Analysis	3 or 4
MATH 461	Probability Theory	3 or 4
MATH 463	Statistics and Probability I	4
MATH 450	Numerical Analysis	3 or 4
Technical/Professional Option ElectivesElectives		
12		

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.*

3*MATH 285%7CCode may be replaced by MATH 441%7CCode followed by MATH 442%7CCode.***4**

If PHYS 486%7C is chosen, take prerequisite MATH 415%7C, which may be used to meet free elective requirements.If PHYS 485%7C is taken, an additional free elective hour or a surplus flexible physics core course hour offsets the one-hour credit differential.

5

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.

6*The Grainger College of Engineering restrictions to free electives can be found here.*

Corresponding Degree	BS Bachelor of Science

Program Features

Academic Level	Undergraduate
Does this major have transcripted concentrations?	No

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	400801 - Physics, General.

Is This a Teacher Certification Program?

No

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 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.

Describe how critical academic functions such as admissions and student advising are managed.

Enrollment

Describe how this revision will impact enrollment and degrees awarded.

This revision should have no impact on enrollment. It more correctly documents current practice.

Estimated Annual Number of Degrees Awarded

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?

No

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.22.094
Attach Rollback/Approval Notices	ep22094_response from sponsor_20220214.pdf
This proposal requires HLC inquiry	No

DMI Documentation

Attach Final Approval Notices	
Banner/Codebook Name	BS: Physics -UIUC
Program Code:	10KP0240BS

Minor Code	Conc Code	Degree Code	Major Code
0240		BS	

Senate Approval Date	
Senate Conference Approval Date	
BOT Approval Date	
IBHE Approval Date	

HLC Approval Date	
Effective Date:	
Attached Document	
Justification for this request	
Program Reviewer Comments	**Brooke Newell (bsnewell) (11/05/21 8:02 am):** Rollback: see email **Brooke Newell (bsnewell) (12/12/21 2:20 pm):** Rollback: per email.

Key: 117

🟩 Addition
🟥 Deletion
🟨 Modification

Current Program

General education: Students must complete the Campus General Education requirements including the campus general education language requirement.

Orientation and Professional Development		
Code	**Title**	**Hours**
ENG 100	Engineering Orientation[1]	0
PHYS 110	Physics Careers[1]	0
Total Hours		**0**

Foundational Mathematics and Science		
Code	**Title**	**Hours**
MATH 221	Calculus I[2]	4
MATH 231	Calculus II	3
MATH 241	Calculus III	4
MATH 285	Intro Differential Equations[3]	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
CHEM 102	General Chemistry I	3
CHEM 103	General Chemistry Lab I	1
CS 101	Intro Computing: Engrg & Sci	3
Total Hours		**33**

Engineering Physics Technical Core		
Code	**Title**	**Hours**
PHYS 225	Relativity & Math Applications	2
PHYS 325	Classical Mechanics I	3
PHYS 435	Electromagnetic Fields I	3
PHYS 486	Quantum Physics I[4]	4
or PHYS 485	Atomic Phys & Quantum Theory	
Total Hours		**12**

Flexible Physics Core Electives		
Flexible physics core electives. Choose three courses from a departmentally approved list below, with at least one being a lab course (PHYS 401, PHYS 402, PHYS 403, PHYS 404, or PHYS 406). The number of hours varies depending upon the courses chosen.		9-15
PHYS 326	Classical Mechanics II	3
PHYS 401	Classical Physics Lab	3
PHYS 402	Light	3 or 4
PHYS 403	Modern Experimental Physics	4 or 5
PHYS 404	Electronic Circuits	4 or 5
PHYS 406	Acoustical Physics of Music	
PHYS 427	Thermal & Statistical Physics	4
PHYS 436	Electromagnetic Fields II	3
PHYS 460	Condensed Matter Physics	4
PHYS 470	Subatomic Physics	4
PHYS 475	Introduction to Biophysics	3 or 4
PHYS 487	Quantum Physics II	4

Mathematics Elective		
Code	**Title**	**Hours**
Mathematics elective, chosen from a departmentally approved list below:		3
CS 357	Numerical Methods I	3
CS 450	Numerical Analysis	3 or 4
MATH 415	Applied Linear Algebra	3 or 4
MATH 417	Intro to Abstract Algebra	3 or 4
MATH 453	Number Theory	3 or 4
MATH 412	Graph Theory	3 or 4
MATH 413	Intro to Combinatorics	3 or 4
MATH 414	Mathematical Logic	3 or 4
MATH 482	Linear Programming	3 or 4
MATH 347	Fundamental Mathematics	3
MATH 348	Fundamental Mathematics-ACP	4
MATH 424	Honors Real Analysis	3
MATH 441	Differential Equations	3 or 4
MATH 442	Intro Partial Diff Equations	3 or 4
MATH 444	Elementary Real Analysis	3 or 4
MATH 446	Applied Complex Variables	3 or 4
MATH 447	Real Variables	3 or 4
MATH 484	Nonlinear Programming	3 or 4
MATH 489	Dynamics & Differential Eqns	3 or 4
MATH 402	Non Euclidean Geometry	3 or 4
MATH 403	Euclidean Geometry	3 or 4
MATH 423	Differential Geometry	3 or 4
MATH 432	Set Theory and Topology	3 or 4
MATH 481	Vector and Tensor Analysis	3 or 4
MATH 461	Probability Theory	3 or 4
MATH 463	Statistics and Probability I	4
MATH 450	Numerical Analysis	3 or 4

Technical/Professional Option Electives		
Code	**Title**	**Hours**
Technical/professional option electives for the option selected, chosen from a departmentally approved list of Technical/Professional Option Electives (or a list designed for a departmentally approved custom option) below. The number of hours varies depending upon the option chosen.		**12-22**
Acoustical Physics		
ECE 210	Analog Signal Processing	4
ECE 473	Fund of Engrg Acoustics	3 or 4
Choose 2 classes from the following:		
ECE 310	Digital Signal Processing	3
ECE 417	Multimedia Signal Processing	4
ECE 473	Fund of Engrg Acoustics	3
ECE 402	Electronic Music Synthesis	3
PHYS 402	Light	3 or 4
Astrophysics		
ASTR 210	Introduction to Astrophysics	3
ASTR 350	The Big Bang, Black Holes, and the End of the Universe (OR ASTR 406: Galaxies and the Universe)	3
ASTR 404	Stellar Astrophysics	3
ASTR 405	Planetary Systems	3
ASTR 414	Astronomical Techniques	4

Revised Program

General education: Students must complete the Campus General Education requirements including the campus general education language requirement.

Orientation and Professional Development		
Code	**Title**	**Hours**
ENG 100	Engineering Orientation (External transfer students take ENG 300.)	1
PHYS 110	Physics Careers	0
Total Hours		**1**

Foundational Mathematics and Science		
Code	**Title**	**Hours**
MATH 221	Calculus I (MATH 220 may be substituted. MATH 220 is appropriatefor students with no background in calculus. 4 of 5 credit hours count towards degree.)	4
MATH 231	Calculus II	3
MATH 241	Calculus III	4
MATH 257	Linear Algebra with Computational Applications	3
MATH 285	Intro Differential Equations (May be replaced by both MATH 441 and MATH 442.)	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
CHEM 102	General Chemistry I	3
CHEM 103	General Chemistry Lab I	1
CS 101	Intro Computing: Engrg & Sci	3
or CS 124	Introduction to Computer Science I	
Total Hours		**36**

Physics Technical Core		
Code	**Title**	**Hours**
PHYS 225	Relativity & Math Applications	2
PHYS 325	Classical Mechanics I	3
PHYS 435	Electromagnetic Fields I	3
PHYS 486	Quantum Physics I (PHYS 485 may be substituted)	4
Total Hours		**12**

Program Tracks		
Code	**Title**	**Hours**
Students are required to complete one track. Tracks may be selected from one of the departmentally approved lists below. Students may devise an alternative, custom track with a set of courses approved by the department.		**20-32**
Astrophysics Track		**25-27**
ASTR 210	Introduction to Astrophysics	3.00
ASTR 350	The Big Bang, Black Holes, and the End of the Universe	3.00
or ASTR 406	Galaxies and the Universe	
ASTR 404	Stellar Astrophysics	3.00
ASTR 405	Planetary Systems	3.00
ASTR 414	Astronomical Techniques	4.00
	Choose a minimum of 6 hours of courses from the Flexible Physics Core Electives List:	6.00
PHYS 246	Physics on the Silicon Prairie: An Introduction to Modern Computational Physics	2.00
PHYS 326	Classical Mechanics II	3.00
PHYS 370	Introduction to Quantum Information and Computing	3.00
PHYS 427	Thermal & Statistical Physics	4.00
PHYS 436	Electromagnetic Fields II	3.00

Atmospheric Science		
ATMS 201	General Physical Meteorology	3
Choose 4 classes from the following:		
ATMS 301	Atmospheric Thermodynamics	3
ATMS 302	Atmospheric Dynamics I	3
ATMS 304	Radiative Transfer-Remote Sens	3
ATMS 305	Computing and Data Analysis	3
ATMS 306	Cloud Physics	3
ATMS 314	Mesoscale Dynamics	3
ATMS 405	Boundary Layer Processes	4
BioPhysics		
CHEM 104	General Chemistry II (OR CHEM 204)	3
CHEM 105	General Chemistry Lab II (OR CHEM 205)	1
CHEM 232	Elementary Organic Chemistry I (OR CHEM 236)	3 or 4
CHEM 233	Elementary Organic Chem Lab I	2
Choose 2 classes from the following:		
BIOP 401	Introduction to Biophysics	3
MCB 450	Introductory Biochemistry (OR MCB 354: Biochemistry and Physical Basis of Life)	3
PHYS 498	Special Topics in Physics (Quantiative Biology)	4
Business		
ENG 471	Seminar Energy & Sustain Engrg	1
IE 420	Financial Engineering	3 or 4
SE 400	Engineering Law	3 or 4
TE 100	Introduction to Innovation, Leadership and Engineering Entrepreneurship	1
TE 360	Lectures in Engineering Entrepreneurship	1
TE 333	Creativity, Innovation, Vision	4
TE 461	Technology Entrepreneurship	3
TE 450	Startups: Incorporation, Funding, Contracts, & Intellectual Property	3
TE 466	High-Tech Venture Marketing	2

Computational Physics		
CS 173	Discrete Structures (OR MATH 213: Basic Discrete Structures)	3
CS 225	Data Structures	4
Choose 3 classes from the following:		
CS 357	Numerical Methods I	3
CS 420	Parallel Progrmg: Sci & Engrg	3 or 4
CS 418	Interactive Computer Graphics	3 or 4
CS 450	Numerical Analysis	3 or 4
PHYS 298	Freshmen/Sophomore Special Topics in Physics (Computational Physics)	2
PHYS 498	Special Topics in Physics (Computation in Physics)	3

Electrical and Computer Engineering		
ECE 110	Introduction to Electronics (OR ECE 205: Electrical and Electronic Circuits)	1 to 3
ECE 120	Introduction to Computing	4
ECE 210	Analog Signal Processing	4
Take 1 class from the following:		
ECE 310	Digital Signal Processing	3
ECE 330	Power Ckts & Electromechanics	3
ECE 385	Digital Systems Laboratory	3
PHYS 404	Electronic Circuits (or ECE 342: Electronic Circuits)	4 or 5
Energy/Sustainability		
ATMS 201	General Physical Meteorology	3
ATMS 302	Atmospheric Dynamics I	3
ECE 205	Electrical and Electronic Circuits	3
ENG 471	Seminar Energy & Sustain Engrg	1
NRES 210	Environmental Economics	3
Choose 1 class from the following:		
ECE 333	Green Electric Energy	3
NPRE 402	Nuclear Power Engineering	3 or 4
NPRE 412	Nuclear Power Econ & Fuel Mgmt	3 or 4
NPRE 470	Fuel Cells & Hydrogen Sources	3
NPRE 475	Wind Power Systems	3 or 4
Materials Science		
MSE 206	Mechanics for MatSE	4
MSE 280	Engineering Materials	3
MSE 401	Thermodynamics of Materials (OR PHYS 427: Thermal & Statistical Physics)	3
Choose 1 class from the following:		
MSE 304	Electronic Properties of Matls	3
MSE 402	Kinetic Processes in Materials	3
MSE 403	Synthesis of Materials	3
MSE 405	Microstructure Determination	3
MSE 406	Thermal-Mech Behavior of Matls	3
Nuclear Physics		
NPRE 402	Nuclear Power Engineering	3 or 4
PHYS 470	Subatomic Physics	4
Choose 2 classes from the following:		
NPRE 435	Radiological Imaging	3
NPRE 441	Radiation Protection	4
NPRE 446	Radiation Interact w/Matter I	3

PHYS 446	Modern Computational Physics	3.00
PHYS 460	Condensed Matter Physics	4.00
PHYS 470	Subatomic Physics	4.00
PHYS 487	Quantum Physics II	4.00
	Choose 1 course from the Physics Lab Electives List:	3.00
PHYS 371	Project Design and Execution in a Physics Context	3.00
PHYS 401	Classical Physics Lab	3.00
PHYS 402	Light	4.00
PHYS 403	Modern Experimental Physics	5.00
PHYS 404	Electronic Circuits	5.00

Business Track		**30-32**
ENG 471	Seminar Energy & Sustain Engrg	1.00
IE 420	Financial Engineering	3.00
SE 400	Engineering Law	3.00
TE 100	Introduction to Innovation, Leadership and Engineering Entrepreneurship	1.00
TE 333	Creativity, Innovation, Vision	4.00
TE 360	Lectures in Engineering Entrepreneurship	1.00
TE 450	Startups: Incorporation, Funding, Contracts, & Intellectual Property	3.00
TE 461	Technology Entrepreneurship	3.00
TE 466	High-Tech Venture Marketing	2.00
	Choose a minimum of 6 hours of courses from the Flexible Physics Core Electives List:	6.00
PHYS 246	Physics on the Silicon Prairie: An Introduction to Modern Computational Physics	2.00
PHYS 326	Classical Mechanics II	3.00
PHYS 370	Introduction to Quantum Information and Computing	3.00
PHYS 427	Thermal & Statistical Physics	4.00
PHYS 436	Electromagnetic Fields II	3.00
PHYS 446	Modern Computational Physics	3.00
PHYS 460	Condensed Matter Physics	4.00
PHYS 470	Subatomic Physics	4.00
PHYS 487	Quantum Physics II	4.00
	Choose 1 course from the Physics Lab Electives List:	3.00
PHYS 371	Project Design and Execution in a Physics Context	3.00
PHYS 401	Classical Physics Lab	3.00
PHYS 402	Light	4.00
PHYS 403	Modern Experimental Physics	5.00
PHYS 404	Electronic Circuits	5.00

Computational Physics Track		**24-27**
CS 173	Discrete Structures	3.00
or MATH 213	Basic Discrete Structures	
CS 225	Data Structures	4.00
	Choose 3 courses from the following list. If PHYS 246 and/or PHYS 446 are chosen they do not fulfill the Flexible Physics Core Elective requirement.	
CS 357	Numerical Methods I	3.00
CS 420	Parallel Progrmg: Sci & Engrg	3.00
CS 418	Interactive Computer Graphics	3.00
CS 450	Numerical Analysis	3.00
PHYS 246	Physics on the Silicon Prairie: An Introduction to Modern Computational Physics	2.00
PHYS 446	Modern Computational Physics	3.00
	Choose a minimum of 6 hours of courses from the Flexible Physics Core Electives List:	6.00
PHYS 326	Classical Mechanics II	3.00
PHYS 370	Introduction to Quantum Information and Computing	3.00
PHYS 427	Thermal & Statistical Physics	4.00
PHYS 436	Electromagnetic Fields II	3.00
PHYS 460	Condensed Matter Physics	4.00
PHYS 470	Subatomic Physics	4.00
PHYS 487	Quantum Physics II	4.00
	Choose 1 course from the Physics Lab Electives List:	3.00
PHYS 371	Project Design and Execution in a Physics Context	3.00
PHYS 401	Classical Physics Lab	3.00
PHYS 402	Light	4.00
PHYS 403	Modern Experimental Physics	5.00
PHYS 404	Electronic Circuits	5.00

Nuclear Physics Track		**22-25**
NPRE 402	Nuclear Power Engineering	3.00
PHYS 470	Subatomic Physics	4.00
	Choose 2 classes from the following:	
NPRE 435	Radiological Imaging	3.00
NPRE 441	Radiation Protection	4.00
NPRE 446	Radiation Interact w/Matter I	3.00
	Choose a minimum of 6 hours of courses from the Flexible Physics Core Electives List:	6.00
PHYS 246	Physics on the Silicon Prairie: An Introduction to Modern Computational Physics	2.00
PHYS 326	Classical Mechanics II	3.00
PHYS 370	Introduction to Quantum Information and Computing	3.00
PHYS 427	Thermal & Statistical Physics	4.00
PHYS 436	Electromagnetic Fields II	3.00
PHYS 446	Modern Computational Physics	3.00

Optical Physics		
ECE 455	Optical Electronics	3 or 4
ECE 460	Optical Imaging	4
ECE 465	Optical Communications Systems	3
Choose 1 class from the following:		
PHYS 402	Light	3 or 4
PHYS 404	Electronic Circuits	4 or 5
PHYS 436	Electromagnetic Fields II	3
Law		
CMN 211	Business and Professional Communication	3
JOUR 200	Introduction to Journalism	3
LAW 301	Introduction to Law	2 or 3
Choose 2 classes from the following:		
ESE 320	Water Planet, Water Crisis	3
NPRE 480	Energy and Security	3
PS 225	Environmental Politics & Policy	3
PS 273	Environment and Society	3
SE 400	Engineering Law	3 or 4
Professional Option		
MATH 415	Applied Linear Algebra	3 or 4
PHYS 326	Classical Mechanics II	3
PHYS 436	Electromagnetic Fields II	3
PHYS 427	Thermal & Statistical Physics	4
PHYS 487	Quantum Physics II	4
Choose 1 lab from the following (cannot count toward Flexible Physics Core):		

PHYS 401	Classical Physics Lab	3
PHYS 402	Light	3 or 4
PHYS 403	Modern Experimental Physics	4 or 5
PHYS 404	Electronic Circuits	4 or 5
Solid State Electronics		
ECE 110	Introduction to Electronics	1 to 3
ECE 444	IC Device Theory & Fabrication	4
PHYS 404	Electronic Circuits	4 or 5
PHYS 460	Condensed Matter Physics	4
Electives		
The Grainger College of Engineering Liberal Education course list, or additional courses from the campus General Education lists for Social and Behavrioal Sciences or Humanities and the Arts 5		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 earned toward the degree. The number of hours varies depending upon the total hours earned in both the Flexible Physics Core and the Technical/Professional Option and whether or not MATH 415 and PHYS 486 are taken in place of PHYS 485. 6		13-37
Total Hours of Curriculum to Graduate		**128**

Footnotes:	
[1]	External transfer students take ENG 300 instead.
[2]	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.*
[3]	*MATH 285 may be replaced by MATH 441 followed by MATH 442.*
[4]	*If PHYS 486 is chosen, take prerequisite MATH 415, which may be used to meet free elective requirements.If PHYS 485 is taken, an additional free elective hour or a surplus flexible physics core course hour offsets the one-hour credit differential.*
[5]	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.
[6]	The Grainger College of Engineering restrictions to free electives can be found here.

PHYS 460	Condensed Matter Physics	4.00
PHYS 487	Quantum Physics II	4.00
	Choose 1 course from the Physics Lab Electives List:	3.00
PHYS 371	Project Design and Execution in a Physics Context	3.00
PHYS 401	Classical Physics Lab	3.00
PHYS 402	Light	4.00
PHYS 403	Modern Experimental Physics	5.00
PHYS 404	Electronic Circuits	5.00

Graduate Study Track		**20-24**
	Take the following four courses from the Flexible Physics Core Electives List:	14
PHYS 326	Classical Mechanics II	3.00
PHYS 427	Thermal & Statistical Physics	4.00
PHYS 436	Electromagnetic Fields II	3.00
PHYS 487	Quantum Physics II	4.00
	Choose two labs from Physics Lab Electives List:	6-10
PHYS 371	Project Design and Execution in a Physics Context	3.00
PHYS 401	Classical Physics Lab	3.00
PHYS 402	Light	4.00
PHYS 403	Modern Experimental Physics	5.00
PHYS 404	Electronic Circuits	5.00
Free Electives		
Additional Course work subject to the Grainger College of Engineering restrictions to Free Electives so that there are at least 128 credit hours earned toward the degree. The number of hours varies depending upon the total hours earned in Flexible Physics Electives, Physics Lab Electives, and Program Track.		**31-43**
Total Hours of Curriculum to Graduate		**128**

Footnotes:	

ILLINOIS

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.

Sincerely,

Germán Bollero, Interim Dean

ILLINOIS

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,

Cheryl Hanley-Maxwell

Dean

UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

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.

Sincerely,

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

UNIVERSITY OF ILLINOIS 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.

Sincerely,

Kevin Hamilton
Dean and Professor

UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

College of Liberal Arts & Sciences
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.

Sincerely,

Venetria K. Patton
Harry E. Preble Dean

UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

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.

Sincerely,

Tracy Sulkin
Dean, College of Media

Gies College of Business
UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

Office of the Dean
260 Wohlers Hall, 1206 S. 6th Street
Champaign, IL 61820
217.333.2747

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.

Sincerely,

Jeffrey R. Brown
Dean, Gies College of Business

UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

School of Information Sciences
501 E. Daniel St., MC-493
Champaign, IL 61820-6211

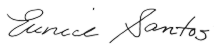
February 3, 2022

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.

Sincerely,



Eunice Santos
Professor and Dean

ILLINOIS

DEPARTMENT OF COMPUTER SCIENCE
Thomas M. Siebel Center for Computer Science
201 N. Goodwin Ave.
Urbana, IL 61801-2302 USA

NANCY M. AMATO
Abel Bliss Professor and Head
2248 Siebel Center
namato@illinois.edu

December 9, 2021

Dear Professor Yann Chemla,

Computer Science is fully supportive of the Department of Physics using CS 124 as an option in addition to CS 101 for the introductory programming requirement in their undergraduate degree program 10KP0240BS: Physics, BS.

Sincerely,

Nancy M. Amato
Abel Bliss Professor and Head
Department of Computer Science

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Department of Mathematics

273 Altgeld Hall, MC-382
1409 West Green Street
Urbana, IL 61801

Re: Use of Math 257 in Physics

The Mathematics Department, working with the Grainger College of Engineering, has recently created the course MATH 257, *Linear Algebra with Computational Applications*. Quoting from the justification of the approved proposal, "In the future, MATH 257 will replace the MATH 415 requirement in many science and engineering curricula." With this in mind, the department would be pleased to have Physics add MATH 257 as an option to MATH 415 in their programs. As the Mathematics department is reallocating instructional resources from Math 415 to Math 257 as the need shifts, this will not cause any undue difficulties for Mathematics resources.

Sincerely

Randy McCarthy

Randy McCarthy
Professor of Mathematics
Dir of Undergraduate Studies in Math
rmccrthy@illinois.edu

telephone 217-333-3350 • *fax* 217-333-9576
email office@math.uiuc.edu • *url* http://www.math.uiuc.edu/

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

That's fine. Thanks for asking

CHERYL D HANLEY-MAXWELL
Dean

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108 Huff Hall
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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

From: Miller, Nolan H <nmiller@illinois.edu>
Sent: Monday, February 14, 2022 1:49 PM
To: Hanley-Maxwell, Cheryl D <cherylhm@illinois.edu>
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

From: Hanley-Maxwell, Cheryl D <cherylhm@illinois.edu>
Sent: Thursday, February 10, 2022 1:49 PM
To: Miller, Nolan H <nmiller@illinois.edu>
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

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