APPROVED BY SENATE
10/18/2021

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10KP5183BS: NUCLEAR, PLASMA, AND RADIOLOGICAL ENGINEERING, BS

In Workflow

1. U Program Review (dforgacs@illinois.edu; eastuby@illinois.edu; aledward@illinois.edu)
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9. U Senate Conf (none)
10. Board of Trustees (none)
11. IBHE (none)
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Approval Path

1. Tue, 09 Mar 2021 22:42:01 GMT
   Deb Forgacs (dforgacs): Approved for U Program Review
2. Tue, 09 Mar 2021 22:58:56 GMT
   Rizwan Uddin (rizwan): Approved for 1973 Head
3. Tue, 14 Sep 2021 17:53:00 GMT
   Brooke Newell (bsnewell): Approved for KP Committee Chair
4. Tue, 14 Sep 2021 18:06:21 GMT
   Candy Deaville (candyd): Approved for KP Dean
5. Tue, 14 Sep 2021 18:35:51 GMT
   John Wilkin (jpwilkin): Approved for University Librarian
6. Wed, 15 Sep 2021 14:25:52 GMT
   Kathy Martensen (kmartens): Approved for Provost

History

1. Dec 14, 2018 by Deb Forgacs (dforgacs)
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)

Date Submitted:Tue, 09 Mar 2021 19:08:20 GMT

Viewing:10KP5183BS : Nuclear, Plasma, and Radiological Engineering, BS

Changes proposed by: Becky Meline

Proposal Type:

Major (ex. Special Education)

This proposal is for a:

Revision

Administration Details

Official Program Name

Nuclear, Plasma, and Radiological Engineering, BS

Sponsor College

Grainger College of Engineering

Sponsor Department

Nuclear, Plasma & Rad Engr

Sponsor Name

Tomasz Kozlwsoki

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College Contact

Brooke Newell

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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.

A BS revision.

Program Justification

Why are these changes necessary?

Scope: The NPRE faculty body upon recommendation by the NPRE Undergraduate Subcommittee have determined that the undergraduate (UG) curriculum requires modification. The modification adds new courses and modifies the content of existing courses, which strengthens the

mathematics requirements and brings more uniformity to the three professional concentration tracks (power, plasma/fusion, and radiological) with respect to 300-level introductory courses and advanced laboratory experiences. We also propose a NPRE Technical Core GPA requirement based on our Sophomore-level courses, NPRE 200 and NPRE 247. New and revised course proposals are included with this proposed curriculum modification.

NPRE Technical Core GPA Requirement. We propose to implement a NPRE Technical Core GPA requirement as a graduation requirement. The NPRE Technical Core GPA requirement is a letter grade of C or better for both NPRE 200 and NPRE 247, which sets the minimum TGPA≥2.00. These two courses are taken in the 3rd and 4th semester during the recommended course sequence.

Synopsis: New required courses are added to eliminate deficiencies in the current curriculum related to mathematics, heat transfer, and advanced laboratory experiences. Existing courses are revised to eliminate redundancy, bring content in line with expected levels of mastery, and more efficient content delivery. In addition, unnecessary courses are eliminated from the NPRE UG curriculum. The combined effect is a NPRE UG curriculum that is more efficient with respect to delivery and effectiveness in preparation of UG students for employment or graduate school. A summary of the changes is as follows:

NPRE 200 new course. A new NPRE applied mathematics course is proposed, NPRE 200 (Mathematics for NPRE (2 credit hours, taken S3). This course is required of all UG students and covers NPRE-specific mathematic concepts with examples and applications in NPRE. This course also serves as a foundation for the three NPRE professional concentration tracks and a bridge from NPRE 100 (S1) to NPRE 247 (S4).

NPRE 321/NPRE 330/349 new or revised 300-level courses. Three new (321, 330, 349) courses within the NPRE department are proposed at the 300 level: NPRE 321 Introduction to Plasma and Applications (already approved), 330 Materials in Nuclear Engineering, and 349 Introduction to NPRE Heat Transfer. These are required of all UG students. These bring uniformity to the three tracks via introductory courses in each professional concentration required of all NPRE UG students, thereby giving each exposure to content outside of their respective concentration area.

NPRE 445 new course. The current curriculum requires NPRE 446 and NPRE 447 (3 credit hours each, 6 total), a two-semester Radiation Interaction with Matter I and II sequence. Under the proposed curriculum revision, NPRE 445 (4 hours) would encompass the material from both the previous 446 and NPRE 447 which would be discontinued as a requirement. The introduction of NPRE 321 Introduction to Plasma and Applications and NPRE 200 Mathematics for NPRE will cover the essential electrodynamics (321) and mathematics (200) necessary for NPRE 445 and therefore reduce the time needed to cover this preparatory material in NPRE 446.

NPRE 449 new course. NPRE 448 Nuclear Systems Engineering and Design is a current 4-hour course. Under the proposed curriculum revision, NPRE 448 would be reduced to 3 hours. The heat transfer fundamentals currently in NPRE 448 would be taken out of the course and instead covered in NPRE 349 Introdution to Heat Tranfer.

NPRE 452 new course. Advanced 2 hour labs are required across all three concentrations, (432 power, 423 plasma/fusion, none exists for radiological). Currently there is no in-house option for students in the radiological concentration, these student fulfill their advanced lab requirement with courses taken from outside NPRE. The proposed NPRE 452 resolves this issue. The proposed course provides advanced lab experience with current radiation detection methods that exploit modern physics concepts applied in a radiological science research context.

MATH 257 addition. NPRE 415 Applied Linear Algebra is a current technical elective for our students across all three concentrations. The Department regularly solicits feedback from our graduating seniors and repeatedly it has been recommended by them to add a linear algebra course to the core curriculum. Input from students has been that it's very applicable to the understanding of the content in many of the upper-level NPRE courses. As is now known, the Mathematics Department has recently created the new course MATH 257 Linear Algebra with Computational Applications as a future replacement to MATH 415 which will eventually be phased out. The addition of MATH 257 to our core requirements will further strengthen our students computational preparation for the higher level NPRE courses.

TAM 335 or ME 310 core requirement addition. The content in TAM 335 or ME 310 is deemed essential to all NPRE UG students and so one of these courses is proposed to be required of all UG students. Currently, radiological track students are not required to take TAM 335/ME 310.

ECE 206 deletion. The ECE department revised ECE 205 (Electrical and Electronic Circuits) and ECE 206 (Electrical and Electronic Circuits Lab) several years back. They embedded into 205 labs that were previously taught in 206. With this revision, NPRE no longer saw a reason for our students to take 206, the lab experience they receive in 205 is sufficient for our needs. The ECE department was consulted at that time to confirm the content of the revised courses and to note that ECE 206 would no longer be required of our students. We have been submitting curricular revisions for the ECE 206 requirement. With the deletion of ECE 206 in our revised curriculum this brings the curriculum in line with our practices.

PHYS 214 deletion. PHYS 214 (University Physics: Quantum Mechanics) is redundant with NPRE 446 and is dropped. The Physics department has been notified of this.

Under the Professional Concentration Area Electives students in the power concentration will select 2 courses from NPRE 412, NPRE 430, NPRE 442, NPRE 457, NPRE 461, NPRE 480, and NPRE 498. This will ensure that they have sufficient 400 level technical electives from within the department. NPRE 201, NPRE 398, NPRE 481, and NPRE 483 may still be taken towards technical electives in addition to courses from the above restricted list. MATH 415 (Applied Linear Algebra) will be discontinued as a technical elective option as now MATH 257 (Linear Algebra with Computational Applications) becomes a requirement.

Further, in the NPRE Professional Concentrations, each concentration went from 25 credit hours to 17 credit hours, with some courses (such as TAM 335/ME 310 and NPRE 321) moving to required Technical Core.

NPRE Technical Core GPA Requirement. NPRE 200 (new course) and NPRE 247 are to be sophomore gateway courses to the required upper-level 300 and 400 level NPRE courses. Students who perform poorly in these two courses, as defined as a C- or less, will not have the adequate foundation to do well in the higher level courses. A technical core GPA requirement with a minimum TGPA ≥2.00 in these two courses will ensure that students have at least a basic level understanding of the material necessary for the higher level NPRE courses. It is already standard practice in NPRE to advise students who receive a C- or lower in NPRE 247 to retake the course before proceeding on to higher level NPRE courses. A NPRE Technical Core GPA Requirement will help to enforce this procedure.

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?

No

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 Department of Nuclear, Plasma, and Radiological Engineering has undergraduate curriculum program education objectives (PEOs) that prepare our graduates to succeed in early career (two to five years post-graduation) professional activities in paths related to the NPRE discipline. These PEOs are:

1. To succeed as engineers in the 21st Century in a globally-connected technological environment in which best practices are shared internationally free of borders.
2. To advance in career paths associated with the NPRE disciplines, including commercial nuclear power, plasma sciences and technology, and radiological sciences related opportunities.
3. To pursue further academic growth, obtaining advanced degrees in disciplines related, but not limited, to the disciplines associated with NPRE technical areas.
4. To provide leadership to professional and societal communities in a general way and in ways specific to the NPRE disciplines.
5. To engage in life-long learning and professional development, staying abreast of the ever-evolving technological landscape related to the NPRE disciplines.
6. To contribute to society in a professional, responsible and ethical manner.

Process for Development and Approval of NPRE Program Educational Objectives:

1. A subgroup of the NPRE Faculty drafts a revised set of PEOs consistent with desired impact of the NPRE BS degree program.
2. The proposed PEOs were presented to the full NPRE faculty for discussion and possible revision.
3. Following updates of the draft PEOs by the NPRE faculty, the proposed new PEOs are sent to the entire NPRE Advisory Board (Constituent Alumni Industry Advisory Board) for their input and comment. In order to provide sufficient exchange among the NPRE Board members, a conference call is held to systematically discuss the proposed PEOs. This discussion may result in additional changes to the proposed set of PEOs. In the case of the 2013 Constituent Alumni Industry Advisory Board, a heavier emphasis on "leadership" and an independent statement about profession and ethical behavior also included to emphasize the importance of this objective.
4. All current NPRE BS students are invited to participate in a general discussion about the PEOs and to provide comments about their content and implantation. A discussion session was held with a representative number of students which provided further revisions in the PEO's particularly in terms of the wording regarding future professional practice. In addition, the local ANS student chapter was asked to review the PEOs for value and appropriateness.
5. The revised and vetted PEOs were again presented to the full NPRE faculty. Revisions during the other review steps were discussed as well as other suggestions from the various groups. The NPRE faculty voted unanimously to accept the final version of the revised PEOs.
6. The new NPRE PEOs were placed on the NPRE website so that they were available to the public and in particular the various constituencies of the NPRE BS degree program.

This process allows for assessment and improvements required to maintain the quality and vitality of the program. The central component in the process is the Faculty of the NPRE Department since they are directly responsible for setting the Program Educational Objectives, instituting changes in the courses and curriculum based on a careful analysis of the assessment data, and developing capable B.S. graduates who achieve the Program Educational Objectives.

The student outcomes are:

1. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.
a) Identify, formulate, and solve engineering problems.
b) Advanced mathematics applied to nuclear engineering concepts.
c) Transport and interaction of radiation with matter.
d) Atomic and nuclear physics, quantum mechanics.
e) Computational solutions.
2. An ability to apply the engineering design process to produce solutions that meet specified needs with consideration for public health and safety, and global, cultural, social, environmental, economic, and other factors as appropriate to the discipline.
3. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
a) Develop and conduct experiments, analyze and interpret data, and use engineering judgment to draw conclusions.
b) Measure nuclear and radiation processes specifically.
c) Analyze and interpret data, using engineering judgement to draw conclusions from experimental data.
4. An ability to communicate effectively with a range of audiences.
5. 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.
a) Recognize ethical and professional responsibilities.
b) Make informed judgements.
6. An ability to recognize the ongoing need to acquire new knowledge, to choose appropriate learning strategies, and to apply this knowledge.
7. An ability to function effectively as a member or leader of a team that establishes goals, plans tasks, meets deadlines, and creates a collaborative and inclusive environment.

The relationship between the Program Educational Objectives and the Student Outcomes are maintained by the department. Student Outcomes represent process-oriented activities that either directly or in combination prepare students to satisfy all PEOs upon completion of the B.S. NPRE degree program.

The assessment process for student outcomes employed by the NPRE Department is as follows:

1. Work products for each 1-7 outcomes (including sub-outcomes) are determined by each instructor in consultation with the Associate Head for Undergraduate Programs (Kozlowski). The frequency of this element of our process is approximately once every two years.
2.The level of mastery is determined by each instructor and review by the Associate Head for Undergraduate Programs. Generally, typically work products require levels of mastery at 75% or higher.
3. Instructors for the courses coupled to the 1-7 outcomes collect the associated work products and distill these into a numeric scores. This occurs each semester the course is taught.
4. The instructor determines the percentage of students obtaining mastery for each work product. This occurs each semester the course is taught.
5. The instructor generates a document that includes the performance of the student body in the course with respect to the outcome and the number of students that achieved mastery. This occurs each semester the course is taught.
6. These reports are forwarded to the Associate Head for Undergraduate Programs for review. This occurs each semester the course is taught.
7. Periodically, the Undergraduate Curriculum subcommittee reviews the reports. This is review then serves as a basis for modification of either the course or elements of the NPRE curriculum. The frequency of this element of our process is approximately once every two years.
8. The Undergraduate Curriculum subcommittee reviews the assessments work products periodically to ensure these continue to be appropriate for 1-7 outcome assessment. The frequency of this review is approximately once every two years. Instructors are consulted if this review determines that changes in work product(s) are warranted.

The assessment of student outcomes forms the basis of the NPRE Department continuous improvement process for the undergraduate curriculum. These are routinely reviewed by the Associate Head for Undergraduate Programs and by the Undergraduate Curriculum Subcommittee.

Suggestions for changes and improvements in the academic program are encouraged and sought from all members of the Department constituencies. Suggestions may be submitted formally or informally, or may develop from a general assessment of changes in the discipline due to local, national, or international policies or trends. Suggestions for changes or improvements are considered by the Faculty, typically in faculty meetings or in ad hoc subcommittees of the Faculty. Individuals or groups may develop substantive proposals for changes which would be implemented pending a positive response from the Faculty in consultation with the constituencies.

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

NPRE BS Side by Side Revised.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

Statement for Programs of Study Catalog

Graduation Requirements

Minimum Technical GPA (https://wiki.illinois.edu/wiki/display/ugadvise/Degree+Requirements/#DegreeRequirements-TechnicalGPARequirement)**: 2.0**
TGPA is required for NPRE 200 and NPRE 247. SeeTechnical GPA (https://wiki.illinois.edu/wiki/display/ugadvise/Degree+Requirements/#DegreeRequirements-TechnicalGPARequirement)to clarify requirements.

Minimum Overall GPA:2.0

Minimum hours required for graduation:128 hours
General education:Students must complete the Campus General Education (https://courses.illinois.edu/gened/DEFAULT/DEFAULT/)**requirements including the campus general education language requirement. One of the SBS courses must be an introductory economics course (ECON 102 or ECON 103).**

Orientation and Professional Development

Code	Title	Hours
ENG 100	Engineering Orientation[1]	0
NPRE 100	Orientation to NPRE	1
Total Hours		1

Foundational Mathematics and Science

Code	Title	Hours
CHEM 102	General Chemistry I	3
CHEM 103	General Chemistry Lab I	1
MATH 221	Calculus I[2]	4
MATH 231	Calculus II	3
MATH 241	Calculus III	4
MATH 257	Linear Algebra with Computational Applications	3
MATH 285	Intro Differential Equations	3
PHYS 211	University Physics: Mechanics	4

PHYS 212	University Physics: Elec & Mag	4
PHYS 214	Univ Physics: Quantum Physics	2
Total Hours		29

Nuclear, Plasma, and Radiological Engineering Technical Core

Code	Title	Hours
CS 101	Intro Computing: Engrg & Sci[3]	3
ECE 205	Electrical and Electronic Circuits	3
ECE 206	Electrical and Electronic Circuits Lab	1
ME 200	Thermodynamics	3
ME 310	Fundamentals of Fluid Dynamics	4
or TAM 335	Introductory Fluid Mechanics	
NPRE 200	Mathematics for Nuclear, Plasma, and Radiological Engineering (Mathematics for NPRE)	2
NPRE 247	Modeling Nuclear Energy System	3
NPRE 431	Materials in Nuclear Engrg	3
NPRE 321	Introduction to Plasmas and Applications	3
NPRE 330	Course NPRE 330 Not Found(Materials in Nuclear Engrg)	3
NPRE 349	Introduction to NPRE Heat Transfer (Introduction to NPRE Heat Transfer)	2
NPRE 441	Radiation Protection	4
NPRE 446	Radiation Interact w/Matter I	3
NPRE 447	Radiation Interact w/Matter II	3
NPRE 448	Nuclear Syst Engrg & Design	4
NPRE 451	NPRE Laboratory	3
NPRE 445	Interaction of Radiation with Matter (Interaction of Radiation with Matter)	4
NPRE 449	Nuclear Systems Engineering and Design (Nuclear Systems Engineering and Design)	3
NPRE 455	Neutron Diffusion & Transport	4
NPRE 458	Design in NPRE	4
TAM 210	Introduction to Statics[3,4]	2
TAM 212	Introductory Dynamics[4]	3
Total Hours		53

Professional Concentration Area Electives

Code	Title	Hours
Students choose one of the Professional Concentration Areas below.		**17**
Power, Safety, and the Environment		
TAM 335	Introductory Fluid Mechanics	4
or ME 310	Fundamentals of Fluid Dynamics	
NPRE 421	Plasma and Fusion Science	3
NPRE 432	Nuclear Engrg Materials Lab	2
Technical electives broken down as follows:		15
Select 2 courses from the following list:		
NPRE 412	Nuclear Power Econ & Fuel Mgmt	3 or 4
NPRE 430	Advanced Materials in Nuclear Engineering (Adv Materials in Nuclear Engrg)	3
NPRE 442	Radioactive Waste Management	3
NPRE 457	Safety Anlys Nucl Reactor Syst	3 or 4
NPRE 461	Probabilistic Risk Assessment	3 or 4
NPRE 480	Energy and Security	3
NPRE 498	Special Topics	1 to 4

Select 9 credit hours of technical electives from list below. Technical electives selected from departmentally approved Power, Safety, and the Environment elective course work in Common Engineering and Technical Electives or one of the following subfields: Thermal Sciences; Power and Control Systems; Solid, Fluid and Continuum Mechanics; Computational Sciences and Engineering; Environmental Engineering and Science. The student's academic advisor must approve the chosen course set to insure that a strong program is achieved.

Common Engineering and Technical Electives		
MATH 415	Applied Linear Algebra	3 or 4
NPRE 199	Undergraduate Open Seminar (May be taken up to 2 timse in separate seminars for credit towards concentration)	1
NPRE 201	Energy Systems	2 or 3
NPRE 398	Special Topics	1 to 4
NPRE 470	Fuel Cells & Hydrogen Sources	3
NPRE 475	Wind Power Systems	3 or 4
NPRE 481	Writing on Technol & Security[5]	3 or 4
NPRE 483	Seminar on Security	1
STAT 400	Statistics and Probability I	4
Thermal Sciences		
ME 320	Heat Transfer	4
ME 400	Energy Conversion Systems	3 or 4
ME 402	Design of Thermal Systems	3 or 4
ME 404	Intermediate Thermodynamics	4
ME 410	Intermediate Gas Dynamics	3 or 4
ME 411	Viscous Flow & Heat Transfer	4
ME 420	Intermediate Heat Transfer	4
Power and Control Systems		
ECE 329	Fields and Waves I	3
ECE 310	Digital Signal Processing	3
ECE 330	Power Ckts & Electromechanics	3
ECE 476	Power System Analysis	3
ECE 486	Control Systems	4
Solid, Fluid and Continuum Mechanics		
TAM 251	Introductory Solid Mechanics	3
TAM 252	Solid Mechanics Design	1
TAM 424	Mechanics of Structural Metals	3 or 4
TAM 435	Intermediate Fluid Mechanics	4
TAM 445	Continuum Mechanics	4
TAM 451	Intermediate Solid Mechanics	4
TAM 456	Experimental Stress Analysis	3
Computational Sciences and Engineering		
CS 357	Numerical Methods I	3
CS 450	Numerical Analysis	3 or 4
ME 471	Finite Element Analysis	3 or 4
Environmental Engineering and Science		
CEE 201	Systems Engrg & Economics	3
CEE 330	Environmental Engineering	3
CEE 437	Water Quality Engineering	3
CEE 443	Env Eng Principles, Chemical	4
CEE 444	Env Eng Principles, Biological	4
CEE 445	Course CEE 445 Not Found	
CEE 446	Air Quality Engineering	4
CEE 447	Atmospheric Chemistry	4
Plasma and Fusion Science and Engineering		
TAM 335	Introductory Fluid Mechanics	4
or ME 310	Fundamentals of Fluid Dynamics	
NPRE 421	Plasma and Fusion Science	3
NPRE 423	Plasma Laboratory	2
NPRE 429	Plasma Engineering	3

Remaining 9 credit hours of technical electives selected from departmentally approved Plasma and Fusion Science and Engineering elective course work in Common Engineering and Technical Electives or one of the following subfields: Physical Science, Electrical Engineering, or Electronic Materials. The student's academic advisor must approve the chosen course set to ensure that a strong program is achieved.

Common Engineering and Technical Electives		
MATH 415	Applied Linear Algebra	3 or 4
NPRE 199	Undergraduate Open Seminar	1
NPRE 201	Energy Systems	2 or 3
NPRE 398	Special Topics	1 to 4
NPRE 461	Probabilistic Risk Assessment	3 or 4
NPRE 470	Fuel Cells & Hydrogen Sources	3
NPRE 481	Writing on Technol & Security[5]	3 or 4
NPRE 498	Special Topics	1 to 4
STAT 400	Statistics and Probability I	4
Physical Science Electives		
CHEM 104	General Chemistry II	3
CHEM 105	General Chemistry Lab II	1
PHYS 435	Electromagnetic Fields I	3
PHYS 436	Electromagnetic Fields II	3
PHYS 460	Condensed Matter Physics	4
Electrical Engineering Electives		
ECE 329	Fields and Waves I	3
ECE 340	Semiconductor Electronics	3
ECE 441	Physcs & Modeling Semicond Dev	3
ECE 444	IC Device Theory & Fabrication	4
Electronic Materials Electives		
MSE 304	Electronic Properties of Matls	3
MSE 403	Synthesis of Materials	3
MSE 460	Electronic Materials I	3
MSE 461	Electronic Materials II	3
MSE 462	Course MSE 462 Not Found	
Radiological, Medical and Instrumentation Applications		
NPRE 435	Radiological Imaging	3
NPRE 452	Advanced Radiological Science Lab (Advanced Radiological Science Lab)	2 or 4

Remaining 12 credit hours from the Technical electives on the departmentally approved Radiological, Medical and Instrumentation Applications elective course work in Common Engineering and Technical Electives or one of the following subfields: Biomolecular Engineering, Biomedical Engineering, and Radiation Detection and Analysis. The student's academic advisor must approve the chosen course set to ensure that a strong program is achieved.

Common Engineering and Technical Electives		
BIOE 120	Introduction to Bioengineering	1
CHEM 104	General Chemistry II	3
CHEM 105	General Chemistry Lab II	1
CHEM 232	Elementary Organic Chemistry I	3 or 4
CHEM 233	Elementary Organic Chem Lab I	2
IB 150	Organismal & Evolutionary Biol	4
IB 151	Organismal & Evol Biol Lab	1
MATH 415	Applied Linear Algebra	3 or 4
ME 310	Fundamentals of Fluid Dynamics	4
MCB 150	Molec & Cellular Basis of Life	4
MCB 151	Molec & Cellular Laboratory	1
NPRE 199	Undergraduate Open Seminar ((May be taken up to 2 times in separate seminars for credit towards concentration))	1
NPRE 201	Energy Systems	2 or 3

NPRE 398	Special Topics	1 to 4
NPRE 421	Plasma and Fusion Science	3
NPRE 461	Probabilistic Risk Assessment	3 or 4
NPRE 481	Writing on Technol & Security[5]	3 or 4
NPRE 498	Special Topics	1 to 4
STAT 400	Statistics and Probability I	4
TAM 335	Introductory Fluid Mechanics	4
Biomolecular Engineering Electives		
BIOE 120	Introduction to Bioengineering	1
BIOE 414	Biomedical Instrumentation	3-4
or CHBE 472	Techniques in Biomolecular Eng	
CHEM 232	Elementary Organic Chemistry I	3 or 4
MCB 450	Introductory Biochemistry	3
MCB 401	Cellular Physiology	3
or BIOP 401	Introduction to Biophysics	
MCB 403	Cell & Membrane Physiology Lab	1 or 2
Biomedical Engineering Electives		
BIOE 120	Introduction to Bioengineering	1
CHEM 232	Elementary Organic Chemistry I	3 or 4
ECE 380	Biomedical Imaging	3
BIOE 414	Biomedical Instrumentation	3-4
or CHBE 472	Techniques in Biomolecular Eng	
BIOE 415	Biomedical Instrumentation Lab	2
BIOE 415	Biomedical Instrumentation Lab	2
NPRE 444	Nuclear Analytical Methods Lab	2 or 3
ECE 480	Magnetic Resonance Imaging	3 or 4
MCB 250	Molecular Genetics	3
MCB 252	Cells, Tissues & Development	3
MCB 401	Cellular Physiology	3
or BIOP 401	Introduction to Biophysics	
MCB 402	Sys & Integrative Physiology	3
MCB 403	Cell & Membrane Physiology Lab	1 or 2
MCB 403	Cell & Membrane Physiology Lab	1 or 2
MCB 404	Sys & Integrative Physiol Lab	1 to 2

Electives

Code	Title	Hours
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[6]		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.[7]		6
Total Hours of Curriculum to Graduate		**128**

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 *Students may elect to take* CS 124 *in place of* CS 101.CS 125 *may be substituted for students entering prior to Fall 2022. And students may elect to take* TAM 211 *in place of* TAM 210*. The extra hour will be applied toward the Professional Concentration Area electives.*

4 *Students may elect to take* PHYS 325 *in place of* TAM 212*. This will facilitate students wishing to pursue the Physics minor to do so while minimizing the number of additional courses.*

5 NPRE 481 *will satisfy a technical elective and the Campus General Education Advanced Composition requirement.*

6 *The Grainger College of Engineering approved liberal education course list can be found* here *(*https://wiki.illinois.edu/wiki/display/ugadvise/Degree+Requirements/#DegreeRequirements-GeneralEducationElectives*). Note that these credit hours could carry the required cultural studies designation required for campus general education requirements.*

7 *The Grainger College of Engineering restrictions to free electives can be found* here (https://wiki.illinois.edu/wiki/display/ugadvise/Degree+Requirements/#DegreeRequirements-FreeElectives).

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

142301 - Nuclear Engineering.

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.

Enrollment

Describe how this revision will impact enrollment and degrees awarded.

Revision will not impact enrollment and degrees awarded.

Estimated Annual Number of Degrees Awarded

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

Financial Resources

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

No

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)

NPRE_letter_NPRE_200.pdf
Support_Letter_NPRE.pdf
NPRE_letter_Math_257.pdf
Chemla_letter_NPRE_revision.pdf
NPRE BS Support Doc LOS CS.docx

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.

The NPRE department has nine power track faculty, four plasma/fusion faculty, and two radiological faculty. We have a teaching matrix, the correlation between courses in the three tracks and individual faculty. The teaching loads are reasonable and we do not anticipate any challenges associated with delivering the modified curriculum.

We do not anticipate any impact on class size, teaching loads, student-faculty ratios, etc. We do not expect any additional advising support will be needed beyond what we currently have in place.

The combined effect is a NPRE UG curriculum that is more efficient with respect to delivery and effectiveness in preparation of UG students for employment or graduate school.

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.

We do not anticipate the revision to have any impact on University Library's resources, collections, and services.

EP Documentation

EP Control Number

EP.22.016

This proposal requires HLC inquiry

Yes

DMI Documentation

Banner/Codebook Name

BS: Nucl, Plasma, Rad Eng-UIUC

Program Code:

10KP5183BS

Degree Code

BS

Major Code

5183

Program Reviewer Comments

Brooke Newell (bsnewell) (Mon, 08 Feb 2021 14:49:09 GMT): Rollback: per email.
Brooke Newell (bsnewell) (Wed, 10 Feb 2021 14:35:39 GMT): Rollback: per discussion
Brooke Newell (bsnewell) (Mon, 15 Feb 2021 14:25:10 GMT): Rollback: per email
Brooke Newell (bsnewell) (Mon, 01 Mar 2021 19:46:28 GMT): Rollback: per discussion
Deb Forgacs (dforgacs) (Mon, 27 Sep 2021 18:21:39 GMT): Re-entered the proposal type, the corresponding program and the CIP code due to system bug 09/27/2021

Key: 123

Key

GREEN HIGHLIGHT = Course addition or updated hours

RED HIGHLIGHT = Course has been removed

Current Requirement	Current Hours	Revised Requirements	Revised Hours
Orientation and Professional Development	**1**	**Orientation and Professional Development**	**1**
ENG 100: Engineering Orientation (External transfer students take ENG 300 instead)[1]	0	ENG 100: Engineering Orientation (External transfer students take ENG 300 instead)[1]	0
NPRE 100: Orientation to NPRE	1	NPRE 100: Orientation to NPRE	1
Foundational Mathematics and Science	**28**	**Foundational Mathematics and Science**	**29**
CHEM 102: General Chemistry I	3	CHEM 102: General Chemistry I	3
CHEM 103: General Chemistry Lab I	1	CHEM 103: General Chemistry Lab I	1
MATH 221: Calculus I (Math 220 may be substituted, with four of the five credit hours applying toward the degree. Math 220 is appropriate for students with no background in calculus.)[2]	4	MATH 221: Calculus I (Math 220 may be substituted, with four of the five credit hours applying toward the degree. Math 220 is appropriate for students with no background in calculus.)[2]	4
MATH 231: Calculus II	3	MATH 231: Calculus II	3
MATH 241: Calculus III	4	MATH 241: Calculus III	4
		MATH 257: Linear Algebra w Computat Appl	**3**
MATH 285: Intro Differential Equations	3	MATH 285: Intro Differential Equations	3
PHYS 211: University Physics: Mechanics	4	PHYS 211: University Physics: Mechanics	4
PHYS 212: University Physics: Elec & Mag	4	PHYS 212: University Physics: Elec & Mag	4
PHYS 214: University Physics: Quantum Physics	2		
Nuclear, Plasma, and Radiological Engineering Technical Core	**46**	**Nuclear, Plasma, and Radiological Engineering Technical Core**	**53**
CS 101: Intro Computing: Engrg & Sci (Students may elect to take CS 125 in place of CS 101. The extra hour will be applied toward the Professional Concentration Area electives.)[3]	3	**CS 101: Intro Computing: Engrg & Sci (Students may elect to take CS 124 in place of CS 101.)[3]**	3
ECE 205: Electrical and Electronic Circuits	3	ECE 205: Electrical and Electronic Circuits	3
ECE 206: Electrical and Electronic Circuits Lab	1		
ME 200: Thermodynamics	3	ME 200: Thermodynamics	3
		ME 310: Fundamentals of Fluid Dynamics or TAM 335: Introductory Fluid Mechanics	**4**
		NPRE 200: Mathematics for Nuclear, Plasma, and Radiological Engineering	**2**
NPRE 247: Modeling Nuclear Energy System	3	NPRE 247: Modeling Nuclear Energy System	3
		NPRE 321: Intro to Plasmas & Application	**3**
		NPRE 330: Materials in Nuclear Engrg	**3**
		NPRE 349: Intro to NPRE Heat Transfer	**2**
NPRE 431: Materials in Nuclear Engrg	3		
NPRE 441: Radiation Protection	4	NPRE 441: Radiation Protection	4
		NPRE 445: Radiation Interact w/Matter I	4
NPRE 446: Radiation Interact w/Matter I	3		
NPRE 447: Radiation Interact w/Matter II	3		
NPRE 448: Nuclear Syst Engrg & Design	4		
		NPRE 449: Nuclear Syst Engrg & Design	**3**
NPRE 451: NPRE Laboratory	3	NPRE 451: NPRE Laboratory	3
NPRE 455: Neutron Diffusion & Transport	4	NPRE 455: Neutron Diffusion & Transport	4
NPRE 458: Design in NPRE	4	NPRE 458: Design in NPRE	4
TAM 210: Introduction to Statics (Students may elect to take TAM 211 in place of TAM 210. The extra will be applied toward the Professional Concentration Area electives.)[3,4]	2	TAM 210: Introduction to Statics (Students may elect to take TAM 211 in place of TAM 210. The extra will be applied toward the Professional Concentration Area electives.)[3,4]	2
TAM 212: Introductory Dynamics[4]	3	TAM 212: Introductory Dynamics[4]	3
Professional Concentration Area Electives (Students choose one of the Professional Concentration Areas	**25**	**Professional Concentration Area Electives (Students choose one of the Professional Concentration Areas below.)**	**25**
Power, Safety, and the Environment Professional Concentration	**25**	**Power, Safety, and the Environment Professional Concentration**	**17**
TAM 335: Introductory Fluid Mechanics or ME 310: Fundamentals of Fluid Dynamics	4		
NPRE 421: Plasma and Fusion Science	3		
NPRE 432: Nuclear Engrg Materials Lab	2	NPRE 432: Nuclear Engrg Materials Lab	2
Technical Electives broken down as follows:	16	**Technical Electives broken down as follows:**	15
Minimum of 6 hours from the list below (restricted electives)		**Select 2 courses from the following list:**	
NPRE 201: Energy Systems	2 or 3		
NPRE 398: Special Topics	1 to 4		
NPRE 412: Nuclear Power Econ & Fuel Mgmt	3 or 4	NPRE 412: Nuclear Power Econ & Fuel Mgmt	3 or 4
		NPRE 430: Advanced Materials in Nuclear Engineering	**3**
NPRE 442: Radioactive Waste Management	3	NPRE 442: Radioactive Waste Management	3
NPRE 457: Safety Anlys Nucl Reactor Syst	3 or 4	NPRE 457: Safety Anlys Nucl Reactor Syst	3 or 4
NPRE 461: Probabilistic Risk Assessment	3 or 4	NPRE 461: Probabilistic Risk Assessment	3 or 4
NPRE 480: Energy and Security	3	NPRE 480: Energy and Security	3
NPRE 481: Writing on Technol & Security	3 or 4		
NPRE 483: Seminar on Security	1		
NPRE 498: Special Topics	1 to 4	NPRE 498: Special Topics	1 to 4
Remaining 10 credit hours of technical electives from list below	10	**Select 9 credit hours of technical electives from list below**	**9**
Common Engineering and Technical Electives		**Common Engineering and Technical Electives**	
NPRE 199: Undergraduate Open Seminar (May be taken up to 2 ties in separate semesters for credit towards	1	NPRE 199: Undergraduate Open Seminar (May be taken up to 2 ties in separate semesters for credit towards concentration)	1
		NPRE 201: Energy Systems	2 or 3
		NPRE 398: Special Topics	1 to 4
MATH 415: Applied Linear Algebra	3 or 4		
NPRE 470: Fuel Cells & Hydrogen Sources	3	NPRE 470: Fuel Cells & Hydrogen Sources	3
NPRE 475: Wind Power Systems	3 or 4	NPRE 475: Wind Power Systems	3 or 4
		NPRE 481: Writing on Technol & Security[5]	3 or 4
		NPRE 483: Seminar on Security	1
STAT 400: Statistics and Probability I	4	STAT 400: Statistics and Probability I	4
Thermal Sciences		**Thermal Sciences**	
ME 320: Heat Transfer	4	ME 320: Heat Transfer	4
ME 400: Energy Conversion Systems	3 or 4	ME 400: Energy Conversion Systems	3 or 4
ME 402: Design of Thermal Systems	3 or 4	ME 402: Design of Thermal Systems	3 or 4
ME 410: Intermediate Gas Dynamics	3 or 4	ME 410: Intermediate Gas Dynamics	3 or 4
ME 411: Viscous Flow & Heat Transfer	4	ME 411: Viscous Flow & Heat Transfer	4
ME 420: Intermediate Heat Transfer	4	ME 420: Intermediate Heat Transfer	4
Power and Control Systems		**Power and Control Systems**	
ECE 329: Fields and Waves I	3	ECE 329: Fields and Waves I	3
ECE 310: Digital Signal Processing	3	ECE 310: Digital Signal Processing	3
ECE 330: Power Ckts & Electromechanics	3	ECE 330: Power Ckts & Electromechanics	3
ECE 476: Power System Analysis	3	ECE 476: Power System Analysis	3
ECE 486: Control Systems	4	ECE 486: Control Systems	4
Solid, Fluid and Continuum Mechanics		**Solid, Fluid and Continuum Mechanics**	
TAM 251: Introductory Solid Mechanics	3	TAM 251: Introductory Solid Mechanics	3
TAM 252: Solid Mechanics Design	1	TAM 424: Mechanics of Structural Metals	1
TAM 424: Mechanics of Structural Metals	3 or 4	TAM 424: Mechanics of Structural Metals	3 or 4
TAM 435: Intermediate Fluid Mechanics	4	TAM 435: Intermediate Fluid Mechanics	4
TAM 445: Continuum Mechanics	4	TAM 445: Continuum Mechanics	4
TAM 451: Intermediate Solid Mechanics	4	TAM 451: Intermediate Solid Mechanics	4
TAM 456: Experimental Stress Analysis	3	TAM 456: Experimental Stress Analysis	3
Computational Sciences and Engineering		**Computational Sciences and Engineering**	
CS 357: Numerical Methods I	3	CS 357: Numerical Methods I	3
CS 450: Numerical Analysis	3 or 4	CS 450: Numerical Analysis	3 or 4
ME 471: Finite Element Analysis	3 or 4	MeE471: Finite Element Analysis	3 or 4

Environmental Engineering and Science			**Environmental Engineering and Science**	
CEE 201: Systems Engrg & Economics	3		CEE 201: Systems Engrg & Economics	3
CEE 330: Environmental Engineering	3		CEE 330: Environmental Engineering	3
CEE 437: Water Quality Engineering	3		CEE 437: Water Quality Engineering	3
CEE 443: Env Eng Principles, Chemical	4		CEE 443: Env Eng Principles, Chemical	4
CEE 444: Env Eng Principles, Biological	4		CEE 444: Env Eng Principles, Biological	4
CEE 445: Air Quality Modeling	4		CEE 445: Air Quality Modeling	4
CEE 446: Air Quality Engineering	4		CEE 446: Air Quality Engineering	4
CEE 447 Atmospheric Chemistry	4		CEE 447 Atmospheric Chemistry	4
Plasma and Fusion Science and Engineering Professional Concentration	**25**		**Plasma and Fusion Science and Engineering Professional Concentration**	**17**
TAM 335: Introductory Fluid Mechanics or ME 310: Fundamentals of Fluid Dynamics	4			
NPRE 421: Plasma and Fusion Science	3		NPRE 421: Plasma and Fusion Science	3
NPRE 423: Plasma Laboratory	2		NPRE 423: Plasma Laboratory	2
NPRE 429: Plasma Engineering	3		NPRE 429: Plasma Engineering	3
Remaining 13 credit hours of technical electives from list below	13		**Remaining 9 credit hours of technical electives from list below**	**9**
Common Engineering and Technical Electives			**Common Engineering and Technical Electives**	
MATH 415: Applied Linear Algebra	3 or 4			
NPRE 199: Undergraduate Open Seminar (May be taken up to 2 ties in separate semesters for credit towards	1		NPRE 199: Undergraduate Open Seminar	1
NPRE 201: Energy Systems	2 or 3		NPRE 201: Energy Systems	2 or 3
NPRE 398: Special Topics	1 to 4		NPRE 398: Special Topics	1 to 4
NPRE 461: Probabilistic Risk Assessment	3 or 4		NPRE 461: Probabilistic Risk Assessment	3 or 4
NPRE 470: Fuel Cells & Hydrogen Sources	3		NPRE 470: Fuel Cells & Hydrogen Sources	3
NPRE 481: Writing on Technol & Security	3 or 4		NPRE 481: Writing on Technol & Security[2]	3 or 4
NPRE 498: Special Topics	1 to 4		NPRE 498: Special Topics	1 to 4
STAT 400: Statistics and Probability I	4		STAT 400: Statistics and Probability I	4
Physical Science Electives			**Physical Science Electives**	
CHEM 104: General Chemistry II	3		CHEM 104: General Chemistry II	3
CHEM 105: General Chemistry Lab II	1		CHEM 105: General Chemistry Lab II	1
PHYS 435: Electromagnetic Fields I	3		PHYS 435: Electromagnetic Fields I	3
PHYS 436: Electromagnetic Fields II	3		PHYS 436: Electromagnetic Fields II	3
PHYS 460: Condensed Matter Physics	4		PHYS 460: Condensed Matter Physics	4
Electrical Engineering Electives			**Electrical Engineering Electives**	
ECE 329: Fields and Waves I	3		ECE 329: Fields and Waves I	3
ECE 340: Semiconductor Electronics	3		ECE 340: Semiconductor Electronics	3
ECE 441: Physics & Modeling Semicond Dev	3		ECE 441: Physics & Modeling Semicond Dev	3
ECE 444: IC Device Theory & Fabrication	4		ECE 444: IC Device Theory & Fabrication	4
Electronic Materials Electives			**Electronic Materials Electives**	
MSE 304: Electronic Prperties of Matls	3		MSE 304: Electronic Prperties of Matls	3
MSE 403: Synthesis of Materials	3		MSE 403: Synthesis of Materials	3
MSE 460: Electronic Materials I	3		MSE 460: Electronic Materials I	3
MSE 461: Electronic Materials II	3		MSE 461: Electronic Materials II	3
Radiological, Medical and Instrumentation Applications	**25**		**Radiological, Medical and Instrumentation Applications**	**17**
NPRE 435: Radiological Imaging	3		NPRE 435: Radiological Imaging	3
Select one from:				
MCB 403: Cell & Membrane Physiology Lab	1 or 2			
BIOE 415: Biomedical Instrumentation Lab	2			
NPRE 444: Nuclear Analytical Methods Lab	2 or 3			
			NPRE 452: Advanced Radiological Science Lab	2 or 4
Remaining 20 credit hours of technical electives from list below	20		**Remaining 12 credit hours of technical electives from list below:**	**12**
Common Engineering and Technical Electives			**Common Engineering and Technical Electives**	
BIOE 120: Introduction to Bioengineering	1		BIOE 120: Introduction to Bioengineering	1
CHEM 104: General Chemistry II	3		CHEM 104: General Chemistry II	3
CHEM 105: General Chemistry Lab II	1		CHEM 105: General Chemistry Lab II	1
CHEM 232: Elementary Organic Chemistry I	3 or 4		CHEM 232: Elementary Organic Chemistry I	3 or 4
CHEM 233: Elementary Organic Chem Lab I	2		CHEM 233: Elementary Organic Chem Lab I	2
IB 150: Organismal & Evolutionary Biol	4		IB 150: Organismal & Evolutionary Biol	4
IB 151: Organismal & Evol Biol Lab	1		IB 151: Organismal & Evol Biol Lab	1
MATH 415 Applied Linear Algebra	4			
ME 310: Fundamentals of Fluid Dynamics	4		ME 310: Fundamentals of Fluid Dynamics	4
MCB 150: Molec & Cellular Basis of Life	4		MCB 150: Molec & Cellular Basis of Life	4
MCB 151: Molec & Cellular Laboratory	1		MCB 151: Molec & Cellular Laboratory	1
NPRE 199: Undergraduate Open Seminar (May be taken up to 2 ties in separate semesters for credit towards	1		NPRE 199: Undergraduate Open Seminar (May be taken up to 2 ties in separate semesters for credit towards concentration)	1
NPRE 201: Energy Systems	2 or 3		NPRE 201: Energy Systems	2 or 3
NPRE 398: Special Topics	1 to 4		NPRE 398: Special Topics	1 to 4
NPRE 421: Plasma and Fusion Science	3		NPRE 421: Plasma and Fusion Science	3
NPRE 461: Probabilistic Risk Assessment	3 or 4		NPRE 461: Probabilistic Risk Assessment	3 or 4
NPRE 481: Writing on Technol & Security	3 or 4		NPRE 481: Writing on Technol & Security[2]	3 or 4
NPRE 498: Special Topics	1 to 4		NPRE 498: Special Topics	1 to 4
STAT 400: Statistics and Probability I	4		STAT 400: Statistics and Probability I	4
TAM 335: Introductory Fluid Mechanics	4			
Biomolecular Engineering Electives			**Biomolecular Engineering Electives**	
BIOE 120: Introduction to Bioengineering	1		BIOE 120: Introduction to Bioengineering	1
BIOE 414: Biomedical Instrumentation or CHBE 472: Techniques in Biomolecular Eng	3-4		BIOE 414: Biomedical Instrumentation or CHBE 472: Techniques in Biomolecular Eng	3-4
CHEM 232: Elementary Organic Chemistry I	3 or 4		CHEM 232: Elementary Organic Chemistry I	3 or 4
MCB 450: Introductory Biochemistry	3		MCB 450: Introductory Biochemistry	3
MCB 401: Cell & Membrane Physiology or BIOP 401: Introduction to Biophysics	3		MCB 401: Cell & Membrane Physiology or BIOP 401: Introduction to Biophysics	3
MCB 403: Cell & Membrane Physiology Lab	1 or 2		MCB 403: Cell & Membrane Physiology Lab	1 or 2
Biomedical Engineering Electives			**Biomedical Engineering Electives**	
BIOE 120: Introduction to Bioengineering	1		BIOE 120: Introduction to Bioengineering	1
CHEM 232: Elementary Organic Chemistry I	3-4		CHEM 232: Elementary Organic Chemistry I	3-4
ECE 380: Biomedical Imaging	3		ECE 380: Biomedical Imaging	3
BIOE 414: Biomedical Instrumentation or CHBE 472: Techniques in Biomolecular Eng	3-4		BIOE 414: Biomedical Instrumentation or CHBE 472: Techniques in Biomolecular Eng	3-4
BIOE 415: Biomedical Instrumentation Lab	2		BIOE 415: Biomedical Instrumentation Lab	2
ECE 480: Magnetic Resonance Imaging	3 or 4		ECE 480: Magnetic Resonance Imaging	3 or 4
MCB 250: Molecular Genetics	3		MCB 250: Molecular Genetics	3
MCB 252: Cells, Tissues & Development	3		MCB 252: Cells, Tissues & Development	3
MCB 401: Cell & Membrane Physiology or BIOP 401: Introduction to Biophysics	3		MCB 401: Cell & Membrane Physiology or BIOP 401: Introduction to Biophysics	3
MCB 402: Sys & Integrative Physiology	3		MCB 402: Sys & Integrative Physiology	3
MCB 403: Cell & Membrane Physiology Lab	1 or 2		MCB 403: Cell & Membrane Physiology Lab	1 or 2
MCB 404: Sys & Integrative Physiolo Lab	1 to 2		MCB 404: Sys & Integrative Physiolo Lab	1 to 2
General Education Requirements			**General Education Requirements**	
A minimum of six courses is required, as follows:	**18**		**A minimum of six courses is required, as follows:**	**18**
Social and Behavioral Sciences *One of the SBS courses must be an introductory economics course (ECON 102	6		Social and Behavioral Sciences *One of the SBS courses must be an introductory economics course (ECON 102 or ECON 103	6
Humanities & the Arts	6		Humanities & the Arts	6
The Grainger College of Engineering Liberal Education course list, or from the campus General Education lists for Social and Behavioral Sciences or Humanities and the Arts	6		The Grainger College of Engineering Liberal Education course list, or from the campus General Education lists for Social and Behavioral Sciences or Humanities and the Arts	6
Cultural Studies: Non-Western Cultures (1 course)			Cultural Studies: Non-Western Cultures (1 course)	
Cultural Studies: U.S. Minorities Cultures (1 course)			Cultural Studies: U.S. Minorities Cultures (1 course)	

Cultural Studies: Western/Comparative Cultures (1 course)	
Non-Primary Language Requirement	**0-9**
Completion of the third semester or equivalent of a non-primary language is required. Completion of three years of a single language in high school satisfies this requirement.	
University Composition	**4-6**
RHET 105: Writing and Research	4
CMN 111: Oral & Written Comm I	3
& CMN 112: and Oral & Written Comm II	3
ESL 111: Intro to Academic Writing I	3
& ESL 112: and Intro to Academic Writing II	3
ESL 115: Principles of Academic Writing	4
Advanced Composition May be satisfied by completing a course in either the liberal education or free elective categories which has the Advanced Composition designation.	
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
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.[6]	6
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 Students may elect to take CS 125 in place of CS 101, and TAM 211 in place of TAM 210. The extra hour will be applied toward the Professional Concentration Area electives.	
[4] Students in the Plasma and Fusion Science Engineering Professional Concentration may elect to take PHYS 325 in place of TAM 212. Further, students in this concentration may elect to take both PHYS 325 and PHYS 326 in place of TAM 210 and TAM 212. The extra hour from PHYS 325 and PHYS 326 will be applied toward the Professional Concentration Area electives.	
[5] The Grainger College of Engineering approved liberal education course list can be found here. Note that thee credit hours could carry the required cultural studies designation required for campus general education requirement.	
[6] The Grainger College of Engineering restrictions to free electives can be found here: https://wiki.illinois.edu/wiki/display/ugadvise/Degree+Requirements#DegreeRequirements-FreeElectives	

Cultural Studies: Western/Comparative Cultures (1 course)	
Non-Primary Language Requirement	**0-9**
Completion of the third semester or equivalent of a non-primary language is required. Completion of three years of a single language in high school satisfies this requirement.	
University Composition	**4-6**
RHET 105: Writing and Research	4
CMN 111: Oral & Written Comm I	3
& CMN 112: and Oral & Written Comm II	3
ESL 111: Intro to Academic Writing I	3
& ESL 112: and Intro to Academic Writing II	3
ESL 115: Principles of Academic Writing	4
Advanced Composition May be satisfied by completing a course in either the liberal education or free elective categories which has the Advanced Composition designation.	
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 [6]	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.[7]	6
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 Students may elect to take CS 124 in place of CS 101. CS 125 may be substituted for students entering prior to Fall 2022. And students may elect to take TAM 211 in place of TAM 210. The extra hour will be applied toward the Professional Concentration Area electives.	
[4] Students may elect to take PHYS 325 in place of TAM 212. This will facilitate students wishing to puruse the Physics minor to do so while minimizing the number of additional courses.	
[5] NPRE 481 will satisfy a technical elective and the Campus General Education Advanced Composition requirement.	
[6] The Grainger College of Engineering approved liberal education course list can be found here. Note that thee credit hours could carry the required cultural studies designation required for campus general education requirement.	
[7] The Grainger College of Engineering restrictions to free electives can be found here: https://wiki.illinois.edu/wiki/display/ugadvise/Degree+Requirements#DegreeRequirements-FreeElectives	

ILLINOIS

THE GRAINGER COLLEGE OF ENGINEERING
Department of Mechanical Science & Engineering
144 Sidney Lu Mechanical Engineering Building, MC-244
1206 W. Green St.
Urbana, IL 61801

19 February, 2021

Tomasz Kozlowski
Associate Head for Undergraduate Programs
Nuclear, Plasma and Radiological Engineering

Dear Prof. Kozlowski,

The Department of Mechanical Science and Engineering will support your request to continue to allow NPRE students to take TAM 335 or ME 310 as part of their curriculum. The change in NPRE curriculum to require one of these courses as mandatory for all NPRE students will not place an unacceptable burden on our department.

Best regards,

Sanjiv Sinha
Associate Head for Undergraduate Programs
Mechanical Science and Engineering

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Department of Mathematics

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

Re: Creation of NPRE 200

The Mathematics Department supports the creation of NPRE 200: Mathematics for Nuclear, Plasma, and Radiological Engineering to be used as a required core technical requirement. The course introduces several critical mathematical topics with specific applications to NPRE. These topics are studied further in subsequent Math courses of the degree, but students would benefit greatly by having this material introduced earlier and it will aid students in understanding how those subsequent Math courses are applied to their major.

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/

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Department of Physics
Loomis Laboratory of Physics
1110 West Green Street
Urbana, IL 61801-3080

Yann Chemla
Professor of Physics
Associate Head for Undergraduate Programs
Center for the Physics of Living Cells

Brooke Newell, MPH
Academic Advisor & Undergraduate Curriculum Coordinator
The Grainger College of Engineering
The University of Illinois at Urbana-Champaign
210A4 Engineering Hall

March 8, 2021

Re: NPRE curriculum revision

Dear Ms. Newell,

As Associate Head for Undergraduate Programs in the Department of Physics, I write this letter to acknowledge NPRE's curriculum revision. The Physics department understands that PHYS 214 will be dropped from the NPRE curriculum. PHYS 214 has a typical enrollment of 450-550 students and will not be impacted negatively by the loss of ~20-30 students per year.

We encourage interested NPRE students to pursue a Physics minor, for which PHYS 214 can be used as a foundational core course.

Sincerely,

Yann Chemla
Professor of Physics
Associate Head for Undergraduate Programs
Department of Physics
161 Loomis, University of Illinois at Urbana-Champaign
1110 W. Green St., Urbana, IL 61801

Cc: Tomasz Kozlowski

Phone: (217) 333-6501 • Fax: (217) 244-7187 • E-Mail: ychemla@illinois.edu
http://www.illinois.edu/~ychemla/

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 NPRE

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 NPRE add MATH 257 to their program. As the Mathematics department is reallocating instructional resources from Math 415, a very large course, to Math 257 as the need shifts, the addition of NPRE students will not cause any undue difficulties for Mathematics.

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: Gunter, Elsa <egunter@illinois.edu>
Sent: Thursday, March 25, 2021 12:49 PM
To: Meline, Becky Jane <bmeline@illinois.edu>
Cc: Kozlowski, Tomasz <txk@illinois.edu>
Subject: Letter of Support fro using CS 124, take 2

Dear Becky Meline,

CS is fully supportive of the Department of Nuclear, Plasma, and Radiological Engineering using CS 124 as an option in addition to CS 101 for the programming requirement in both their 10KP5183BS: Nuclear, Plasma, and Radiological Engineering, BS undergraduate degree program.

---Elsa

--
Elsa L Gunter
Research Professor
Director of Undergraduate Programs
Department of Computer Science
University of Illinois at Urbana - Champaign