APPROVED BY SENATE
02/10/2020



Date Submitted: 01/10/20 8:12 am

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

Last approved: 08/12/19 8:36 am

Last edit: 01/22/20 3:09 pm

Changes proposed by: Brooke Newell

| | |
|---|---|
| Catalog Pages Using this Program | Nuclear, Plasma, & Radiological Engineering, BS |

## In Workflow

1. **U Program Review**
2. **1973 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. DMI

## Approval Path

1. 01/10/20 9:13 am Deb Forgacs (dforgacs): Approved for U Program Review
2. 01/11/20 6:22 am Rizwan Uddin (rizwan): Approved for 1973 Head
3. 01/13/20 11:20 am Michael Hirschi (mch): Approved for KP Committee Chair
4. 01/13/20 11:44 am Candy Deaville (candyd): Approved for KP Dean
5. 01/13/20 11:47 am

John Wilkin (jpwilkin): Rollback to KP Dean for University Librarian
6. 01/13/20 1:25 pm Candy Deaville (candyd): Approved for KP Dean
7. 01/13/20 3:07 pm John Wilkin (jpwilkin): Approved for University Librarian
8. 01/22/20 12:04 pm 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)

## Proposal Type

Proposal Type:
Major (ex. Special Education)

This proposal is for a:
Revision

Proposal Title:

if this proposal is one piece of a multi-element change please include the other impacted programs here. *example: A BS revision with multiple concentration revisions*

**Gen Ed table revisions, removal of a few science elective courses** ~~degree audit update.UG Course lists~~

| | |
|---|---|
| EP Control Number | **EP.102_original** |
| Official Program Name | Nuclear, Plasma, and Radiological Engineering, BS |
| Effective Catalog Term | Fall 2020 |
| Sponsor College | Grainger College of Engineering |
| Sponsor Department | Nuclear, Plasma & Rad Engr |
| Sponsor Name | |
| Sponsor Email | |
| College Contact | College Contact Email |

## Program Description and Justification

Justification for proposal change:

**Updates for Academic Catalog 2020-21**

| | |
|---|---|
| Corresponding Degree | **BS Bachelor of Science** |

Is this program interdisciplinary?

**No**

| | |
|---|---|
| Academic Level | Undergraduate |
| Will you admit to the concentration directly? | |
| Is a concentration required for graduation? | |
| CIP Code | 142301 - Nuclear Engineering. |

Is This a Teacher Certification Program?

No

Will specialized accreditation be sought for this program?

No

## Admission Requirements

Desired
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.

**None.**

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**

## Delivery Method

Is this program available on campus and online? **No**

This program is available:
On Campus

# 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)

# 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

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.

**None.**

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.

**None.**

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 this new program/proposed change result in the replacement of another program?

No

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

No

## 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

Will an existing tuition rate be used or continue to be used for this program?

Yes

## 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).

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 | 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

Catalog Page Text: Description of program for the catalog page. This is not official content, it is used to help build the catalog pages for the program. Can be edited in the catalog by the college or department.

Statement for Programs of Study Catalog

## Graduation 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. One of the SBS courses must be an introductory economics course (ECON 102 or ECON 103).**
~~**Overview of Curricular Requirements The curriculum requires 128 hours for graduation and is organized asfollows.Orientation and Professional Development These courses introduce the opportunities and resources your college, department, and curriculum can offer you as you work to achieve your careergoals.They also provide the skills to work effectively and successfully in the**~~

~~engineeringprofession.Foundational Mathematics and Science These courses stress the basic mathematical and scientific principles upon which the engineering discipline isbased.~~**Orientation and Professional Development**

Course List

| Code | Title | Hours |
|---|---|---|
| ENG 100 | Engineering Orientation 1 | 0 |
| NPRE 100 | Orientation to NPRE | 1 |
| Total Hours | | 1 |

## Foundational Mathematics and Science

Course List

| 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 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 | | 28 |

## Nuclear, Plasma, and ~~and~~ Radiological Engineering Technical Core

Course List

| 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 |
| NPRE 247 | Modeling Nuclear Energy System | 3 |
| NPRE 431 | Materials in Nuclear Engrg | 3 |
| 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 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 | | 46 |

## Professional Concentration Area Electives

Course List

| Code | Title | Hours |
|---|---|---|
| **Students choose one of the Professional Concentration Areas below.** | | **25** |
| **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: | | 16 |
| Minimum of 6 hours from the list below: | | |
| 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 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 481 | Writing on Technol & Security | 3 or 4 |
| NPRE 483 | Seminar on Security | 1 |
| NPRE 498 | Special Topics | 1 to 4 |
| Remaining 10 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 470 | Fuel Cells & Hydrogen Sources | 3 |
| NPRE 475 | Wind Power Systems | 3 or 4 |
| **STAT 400** | **Statistics and Probability I** | **4** |
| Thermal Sciences | | |
| ME 320 | Heat Transfer | 4 |
| ME 400 | Energy Conversion Systems | 3 or 4 |

| Code | Title | Hours |
|---|---|---|
| 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 | Air Quality Modeling | 4 |
| 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** |

| Code | Title | Hours |
|---|---|---|
| **Remaining 13 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** | **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** | **Electronic Materials Lab** | **3** |
| **Radiological, Medical and Instrumentation Applications** | | |
| **NPRE 435** | **Radiological Imaging** | **3** |
| **Select one from:** | | |
| **MCB 403** | **Cell & Membrane Physiology Lab** | **1 or 2** |
| **BIOE 415** | **Biomedical Instrumentation Lab** | **2** |

| Code | Title | Hours |
|---|---|---|
| NPRE 444 | Nuclear Analytical Methods Lab | 2 or 3 |
| **Remaining 20 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 | 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 | Cell & Membrane Physiology | 3 |

| Code | Title | Hours |
|---|---|---|
| **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** |
| **ECE 480** | **Magnetic Resonance Imaging** | **3 or 4** |
| **MCB 250** | **Molecular Genetics** | **3** |
| **MCB 252** | **Cells, Tissues & Development** | **3** |
| **MCB 401** | **Cell & Membrane Physiology** | **3** |
| **or BIOP 401** | **Introduction to Biophysics** | |
| **MCB 402** | **Sys & Integrative Physiology** | **3** |
| **MCB 403** | **Cell & Membrane Physiology Lab** | **1 or 2** |
| **MCB 404** | **Sys & Integrative Physiol Lab** | **1 to 2** |

## Electives

Course List

| 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 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** |

1

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 Area 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 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.***

These courses stress fundamental concepts and basic laboratory techniques that comprise the common intellectual understanding of nuclear engineering. Professional Concentration Area Electives The NPRE Professional Concentration Area requirement is fulfilled by taking certain required technical and some elective technical courses stressing the rigorous analysis and design principles practiced in one of the three professional concentration areas:Power, Safety, and the Environment; Plasma and Fusion Science Engineering; or Radiological, Medical, and Instrumentation Applications. Professional Concentration Areas Students are expected to develop a solid background in one of the various subfields within a Professional Concentration Area which are defined below.Power, Safety, and the Environment Plasma and Fusion Science and Engineering Radiological, Medical and Instrumentation Applications General Education Requirements Non-Primary Language Requirement University Composition These courses teach fundamentals of expository writing. Free Electives

Course List

| Code | Title | Hours |
|---|---|---|
| Free Electives | | |
| 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 |
| Total Hours of Curriculum to Graduate | | 128 |

Course List

| Code | Title | Hours |
|---|---|---|
| Choose one: | | |
| RHET 105 | Writing and Research | |
| CMN 111 & CMN 112 | Oral & Written Comm I and Oral & Written Comm II | |
| ESL 111 & ESL 112 | Intro to Academic Writing I and Intro to Academic Writing II | |
| ESL 115 | Principles of Academic Writing | |

Advanced Composition. May be satisfied by completing a course in either the liberal education or free elective categories which has the Advanced Composition designation. Alternately, NPRE 481 should be considered, which may also be applied to the Professional Concentration elective hours.

Course List

| Code | Title | Hours |
|---|---|---|
| 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. | | 0-9 |

Course List

| Code | Title | Hours |
|---|---|---|
| A minimum of six courses is required, as follows: | | 18 |
| ECON 102 | Microeconomic Principles | 3 |
| or ECON 103 | Macroeconomic Principles | |
| Social and Behavioral Sciences | | 3 |
| 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 |
| Cultural Studies: Non-Western Cultures (1 course) | | |
| Cultural Studies: U.S. Minorities Cultures (1 course) | | |
| Cultural Studies: Western/Comparative Cultures (1 course) | | |

Course List

| Code | Title | Hours |
|---|---|---|
| NPRE 435 | Radiological Imaging | 3 |
| Select one from: | | 2 |
| MCB 403 | Cell & Membrane Physiology Lab | |
| BIOE 415 | Biomedical Instrumentation Lab | |
| NPRE 444 | Nuclear Analytical Methods Lab | |
| Remaining 21-22 credit hours from the Technical electives on the departmentally approved Radiological, Medical and Instrumentation Applications elective course work in 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. The list of courses is below: | | |
| 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 |
| 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 421 | Plasma and Fusion Science | 3 |
| NPRE 481 | Writing on Technol & Security | 3 or 4 |
| NPRE 498 | Special Topics | 1 to 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 | Cell & Membrane 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 |

| Code | Title | Hours |
|---|---|---|
| CHEM 232 | Elementary Organic Chemistry I | 3 or 4 |
| ECE 380 | Biomedical Imaging | 3 |
| BIOE 414 or CHBE 472 | Biomedical Instrumentation Techniques in Biomolecular Eng | 3-4 |
| BIOE 415 | Biomedical Instrumentation Lab | 2 |
| ECE 480 | Magnetic Resonance Imaging | 3 or 4 |
| MCB 401 or BIOP 401 | Cell & Membrane Physiology Introduction to Biophysics | 3 |
| MCB 402 | Sys & Integrative Physiology | 3 |
| MCB 403 | Cell & Membrane Physiology Lab | 1 or 2 |
| MCB 404 | Sys & Integrative Physiol Lab | 1 to 2 |

Course List

| Code | Title | Hours |
|---|---|---|
| TAM 335 or ME 310 | Introductory Fluid Mechanics Fundamentals of Fluid Dynamics | 4 |
| NPRE 421 | Plasma and Fusion Science | 3 |
| NPRE 423 | Plasma Laboratory | 2 |
| NPRE 429 | Plasma Engineering | 3 |
| Remaining 14 credit hours of technical electives selected from departmentally approved Plasma and Fusion Science and Engineering elective course work in one of the following subfields: Physical Science, Electrical Engineering, or Electronic Materials. The student's academic advisor must approve the chosen course set to insure that a strong program is achieved. The list is below: | | 13 |
| | Common Engineering and Technical Electives | |
| MATH 415 | Applied Linear Algebra | 3 or 4 |
| 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 470 | Fuel Cells & Hydrogen Sources | 3 |
| NPRE 481 | Writing on Technol & Security | 3 or 4 |
| NPRE 498 | Special Topics | 1 to 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 |

| Code | Title | Hours |
|---|---|---|
| ECE 340 | Semiconductor Electronics | 3 |
| ECE 441 | Physcs & Modeling Semicond Dev | 3 |
| ECE 444 | IC Device Theory & Fabrication | 4 |
| ECE 484 | Course ECE 484 Not Found | |
| 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 | Electronic Materials Lab | 3 |

Course List

| Code | Title | Hours |
|---|---|---|
| Professional Concentration Area electives. See the Professional Concentration Areas section below. | | 25 |

## EP Documentation

Attach
Rollback/Approval
Notices

## DMI Documentation

Attach Final
Approval Notices

Banner/Codebook
Name
BS: Nucl, Plasma, Rad Eng-UIUC

Program Code: 10KP5183BS

| Minor Code | Conc Code | Degree Code | BS Major Code |
|---|---|---|---|
| 5183 | | | |

Senate Approval
Date

Senate
Conference
Approval Date

BOT Approval
Date

IBHE Approval Date

Effective Date:

Attached Document

Justification for this request

Program Reviewer Comments

**Deb Forgacs (dforgacs) (01/09/20 1:42 pm):** Rollback: .

**John Wilkin (jpwilkin) (01/13/20 11:47 am):** Rollback: I suspect library resources are more than sufficient for this program, but we need a statement from the dept/program to that effect.

Key: 123

| Proposal | Degree | Footnote 1 |
|---|---|---|
| EP.20.91 | BS in Civil Engineering | External transfer students take ENG 300 instead |
| EP.20.92 | BS in Computer Engineering | External transfer students take ENG 300 instead |
| EP.20.93 | BSAG in Agricultural and Biological Engineering | In addition to the Biological and Natural Sciences Elective hours required for Agricultural and Biological Engineering (6 hours), a further 4 hours of biological sciences must be completed to make up a total of 10 hours. |
| EP.20.94 | BS in Agricultural and Biological Engineering | External transfer students take ENG 300 instead |
| EP.20.95 | BS in Agricultural and Biological Engineering: Agricultural Engineering | The extra hour of credit for this course may be used to help meet free elective requirements |
| EP.20.96 | BS in Agricultural and Biological Engineering: Biological Engineering | May be taken for 4 credit hours; the extra hour may be used to help meet free elective requirements |
| EP.20.97 | BS in Computer Science | External transfer students take ENG 300 instead |
| EP.20.98 | BS in Electrical Engineering | External transfer students take ENG 300 instead |
| EP.20.99 | BS in Engineering Mechanics | External transfer students take ENG 300 instead |
| EP.20.100 | BS in Engineering Physics | External transfer students take ENG 300 instead |
| EP.20.101 | BS in Systems Engineering & Design | External transfer students take ENG 300 instead |
| EP.20.102 | BS in Nuclear, Plasma and Radiological Engineering | External transfer students take ENG 300 instead |
| EP.20.103 | BS in Mechanical Engineering | External transfer students take ENG 300 instead |
| EP.20.104 | BS in Materials Science & Engineering | External transfer students take ENG 300 instead |
| EP.20.105 | BS in Industrial Engineering | External transfer students take ENG 300 instead |