

**College of Engineering
Proposed Catalog Changes
Effective Summer 2019**

BIOLOGICAL ENGINEERING

1. Make the following curricular changes to the **Biological Engineering Major (B.S.)**:

Required course work includes the university requirements (see regulation J-3) and:

BE 142	Introduction to Biological Engineering	2
BE 242	Engineering Analysis and Design ^{1,2}	2
BE 441	Instrumentation and Measurements	3
BE 461	Bioprocess Engineering	3
BE 462	Electric Power and Controls	3
BE 478	Engineering Design I	3
BE 479	Engineering Design II	3
BE 491	Senior Seminar	1
BIOL 115	Cells & the Evolution of Life	3
BIOL 115L	Cells and the Evolution of Life Laboratory	1
BIOL 250	General Microbiology	3
BIOL 255	General Microbiology Lab	2
BIOL 380	Biochemistry I	4
CHEM 111	Principles of Chemistry I ^{1,2}	3
CHEM 111L	Principles of Chemistry I Laboratory	1
CHEM 112	Principles of Chemistry II	4
CHEM 112L	Principles of Chemistry II Laboratory	1
CHEM 277	Organic Chemistry I	3
CHEM 278	Organic Chemistry I: Lab	1
COMM 101	Fundamentals of Public Speaking	2
ENGR 105	Engineering Graphics	2 ³
<u>OR GEOG 385</u>	<u>GIS Primer</u>	
ENGR 210	Engineering Statics ^{1,2}	3
ENGR 240	Introduction to Electrical Circuits	3
ENGR 320	Engineering Thermodynamics and Heat Transfer	3
ENGR 335	Engineering Fluid Mechanics	3
ENGR 350	Engineering Mechanics of Materials	3
ENGR 360	Engineering Economy	2
MATH 170	Analytic Geometry and Calculus I	4
MATH 175	Analytic Geometry and Calculus II	4
MATH 275	Analytic Geometry and Calculus III ^{1,2}	3
MATH 310	Ordinary Differential Equations	3
PHYS 211	Engineering Physics I ^{1,2}	3

PHYS 211L	Laboratory Physics I	1
PHYS 212	Engineering Physics II	3
STAT 301	Probability and Statistics	3
Technical Electives		17
Select 9 credits of Engineering electives from any 300 or 400 level Biological e Engineering courses		9
Select 8 9 credits of Technical electives from any 300 or 400 level engineering or sciences courses		9
Total Hours		109 106-107

Courses to total 128 credits for this degree

- ¹ A grade of C or better is required in each of the following courses before registration is permitted in upper-division engineering courses: BE 242, CHEM 111, ENGR 210, MATH 275, and PHYS 211.
- ² To graduate in this program, a grade of C or better is required in each of the following courses: BE 242, CHEM 111, ENGR 210, MATH 275, and PHYS 211.

Available via distance: More than 50% but less than 100% of curricular requirements can be completed via distance

Geographical area: Moscow

Rationale: Re: BE 242 Title and Credit Change-The title change was made to reflect the program name; the credit change was made in order to add engineering computational software content to the course. The number of Technical Elective credits has been reduced by 1 credit (9 to 8) to accommodate this increase in BE 242 credits (Change approved by BE faculty 1/31/2018). See the course change form for BE 242 which was approved by the UCC on 9/17/2018 for further details.

RE: Removal of Comm 101. Comm 101 was not originally part of our program curriculum. During the transition to Biological Engineering from Biological and Agricultural Engineering an editorial error was made which incorporated Comm 101 into the BE program curriculum. The BE faculty has voted and approved its removal, thereby allowing students to fulfill the General Education oral communication requirement, J-3-b, by means of any of the University catalog approved courses for this requirement. This provides greater latitude to the students in course selection to fulfill their degree requirements. (Change approved by BE faculty 1/31/2018).

Re: Change "Engineering" Electives to "Biological Engineering" Electives (Change Approved by BE faculty 9/12/2018)

Rationale: In order to ensure that our students gain depth of knowledge within Biological Engineering, we are reclassifying the 9 credits of generic Engineering Technical Electives (TEs) as Biological Engineering TEs. Background: During our department's transition from "Biological and Agricultural Engineering" (BAE) to "Biological Engineering" (BE), we eliminated the five curriculum option areas; those

option areas nearly completely prescribed the courses students in BAE would take, leaving only one or two technical electives for students in the degree program. Without the defined option areas, the BE curriculum presently includes 9 credits of engineering TEs and 9 (8) credits of engineering or science TEs. At the time the curriculum was developed for BE, we were undergoing a significant faculty transition with several retirements and new hires, and therefore had a limited number of departmental TE courses available, so the Engineering TE's were left unspecified as to the discipline of engineering from which they should be taken.

Workload: Since the vacated faculty lines have been refilled, we have a sufficient number of faculty to offer a wide range of BE TEs, comprised of new courses developed by faculty hired during or since the transition to BE, and courses which were already offered by the faculty who transitioned from BAE to BE. Therefore, there is no added workload associated with courses carried through the program transition, and the workload of new courses added has been met by additional/replacement faculty hires. These additional courses either have already been added or were approved by the UCC on 9/17/2018.

Re: Change ENGR 105 requirement to Choice between ENGR 105 or GEOG 3851 (Change Approved by BE faculty 9/12/2018)

This change provides a graphics/visualization course option for our landscape-scale engineering students with an essential tool (Geographic Information Systems) that is better suited to their engineering career goals than ENGR Graphics, while still providing the ENGR Graphics option to our product/device/facility process-oriented engineering students.

Assessment: Learning outcomes for the revised curriculum will be assessed through the American Board of Engineering and Technology (ABET) accreditation process and the current University of Idaho assessment process, as at present.

1 The Geography Department supports this addition to BE's curriculum.

CIVIL AND ENVIRONMENTAL ENGINEERING

1. Change the following course:

CE 513 Bridge Design

3 credits

Joint-listed with CE 413.

Structural systems for bridges, loading analysis by influence lines, slab and girder bridges, composite design, pre-stressed concrete, rating of existing bridges, specifications and economic factors.

[Cooperative: Available to WSU degree-seeking students.](#)

Prereq: CE 441 or CE 444

Available via distance: Yes

Geographical area: Moscow, Engineering Outreach

Rationale: Adding this course will strengthen on-going cooperation between U of Idaho and WSU Civil Engineering programs, adding to a selection of graduate-level

cooperatively listed structural engineering courses already offered -- 12 at WSU and 5 at the U of Idaho -- most of which are taught alternately on both campuses.

COMPUTER SCIENCE

1. Add the following courses:

CS 453 Advanced Robotics I

3 credits

Joint-listed with CS 553

The course studies the fundamentals of robotics/mechatronics systems and associated artificial intelligence applications. Topics to be covered include: principles of distributed systems control, interfacing and signal conditioning of sensors and actuators, data acquisition and signal processing, microprocessor-based control, physical modeling, and hardware and software simulation for model validation and control.

Prereq: Instructor Permission

CS 553 Advanced Robotics I

3 credits

Joint-listed with CS 453

The course studies the fundamentals of robotics/mechatronics systems and associated artificial intelligence applications. Topics to be covered include: principles of distributed systems control, interfacing and signal conditioning of sensors and actuators, data acquisition and signal processing, microprocessor-based control, physical modeling, and hardware and software simulation for model validation and control.

Prereq: Instructor's Permission

Available via distance: No

Geographical Area: CDA

Rationale: New technical area being introduced into the CS department. New faculty are available in Coeur d'Alene to teach this course.

CS 454 Advanced Robotics II

3 credits

Joint-listed with CS 554

The course continues the study of fundamentals of robotics/mechatronics operating systems and associated specific artificial intelligence applications in Robotics. Topics to be covered include: simulation of mixed environment robotic systems for model validation and control, interfacing and signal conditioning of sensors and actuators, and data acquisition and signal processing. Software architectures utilizing the ROS (Robotic Operating System) will be implemented and demonstrated on the appropriate physical robots and for associated remote computer-based sensors during the course.

Prereq: Instructor permission

CS 554 Advanced Robotics II**3 credits**

Joint-listed with CS 454

The course continues the study of fundamentals of robotics/mechatronics operating systems and associated specific artificial intelligence applications in Robotics. Topics to be covered include: simulation of mixed environment robotic systems for model validation and control, interfacing and signal conditioning of sensors and actuators, and data acquisition and signal processing. Software architectures utilizing the ROS (Robotic Operating System) will be implemented and demonstrated on the appropriate physical robots and for associated remote computer-based sensors during the course.

Prereq: Instructor permission

Available via distance: No

Geographical Area: CDA

Rationale: New technical area being introduced into the CS department. New faculty are available in Coeur d'Alene to teach this course.

2. Change the following courses:

CS 431 (s) SFS Professional Development**1.3 credit**

Joint-listed with CS 531.

[This course is reserved for CyberCorps\(R\) Scholarship for Service program participants.](#)

[Prereq: Instructor Permission](#)

CS 531 (s) SFS Professional Development**1.3 credit**

Joint-listed with CS 431.

[This course is reserved for CyberCorps\(R\) Scholarship for Service program participants.](#)

[Prereq: Instructor Permission](#)

Available via distance: No

Geographical Area: Moscow, Idaho Falls

Rationale: This course meets twice a week and includes a service learning component equivalent to one credit. Increasing the course credits to 3 will help match the time students dedicate to all CyberCorps(R) Scholarship for Service tasks required by the program and the time dedicated to the service learning component. Resource impact: There are no additional teaching resources needed to implement this change. This course is already being taught in the proposed manner to successfully accommodate all requirements of the CyberCorps(R) SFS program and to help students succeed in their academic career and cybersecurity job search and placement required by the program. This course cannot be used as a CS Technical Elective.

3. Make the following curricular changes to the **Computer Science Major (B.S.C.S.)**:

Required course work includes the university requirements (see regulation J-3) and:

COMM 101	Fundamentals of Public Speaking	2
ENGL 317	Technical Writing	3
CS 120	Computer Science I	4
CS 121	Computer Science II	3
CS 150	Computer Organization and Architecture	3
CS 210	Programming Languages	3
CS 240	Computer Operating Systems	3
CS 270	System Software	3
CS 360	Database Systems	3
CS 385	Theory of Computation	3
CS 395	Analysis of Algorithms	3
CS 401	Contemporary Issues in Computer Science	1
CS 445	Compiler Design	4
CS 480	CS Senior Capstone Design I	3
CS 481	CS Senior Capstone Design II	3
MATH 170	Analytic Geometry and Calculus I	4
MATH 175	Analytic Geometry and Calculus II	4
MATH 176	Discrete Mathematics	3
MATH 275	Analytic Geometry and Calculus III (or any upper division MATH or STAT course)[±]	3
MATH 330	Linear Algebra	3
STAT 301	Probability and Statistics	3
Select one of the following laboratory science sequences:		8-9
BIOL 114 & BIOL 115 & BIOL 115L	Organisms and Environments and Cells & the Evolution of Life and Cells and the Evolution of Life Laboratory	
CHEM 111 & CHEM 112	Principles of Chemistry I and Principles of Chemistry II	
PHYS 211 & 211L & PHYS 212 & PHYS 212L	Engineering Physics I and Laboratory Physics I and Engineering Physics II and Laboratory Physics II	
PHYS 211 & 211L & PHYS 213	Engineering Physics I and Laboratory Physics I and Engineering Physics III	
Natural Sciences with Lab for Science and Engineering Majors from Two Different Disciplines: Complete two courses including their accompanying labs from the following list:		8

[BIOL 114](#) [Organisms and Environments](#)

CHEM 111	Principles of Chemistry I	
& CHEM 111L	Principles of Chemistry I Laboratory	
ENVS 101	Introduction to Environmental Science	
& ENVS 102	Field Activities in Environmental Sciences	
GEOG 100	Physical Geography	
& GEOG 100L	Physical Geography Lab	
GEOL 102	Historical Geology	
& GEOL 102L	Historical Geology Lab	
PHYS 211	Engineering Physics I	
& PHYS 211L	Laboratory Physics I	
SOIL 205	The Soil Ecosystem	
& SOIL 206	The Soil Ecosystem Lab	
Select 12 credits of any upper-division Computer Science courses except CS 398, 400, 401, 431, 499		12
Select Science elective from the following sets of courses		4
All Biology courses except BIOL 102		
All Chemistry courses except CHEM 101		
ENVS 101	Introduction to Environmental Science	
& ENVS 102	and Field Activities in Environmental Sciences	
GEOG 100	Physical Geography	
GEOG 301	Meteorology	
GEOG 401	Climatology	
All Geology courses		
All Microbiology, Molecular Biology and Biochemistry courses		
All Physics courses PHYS 100, PHYS 200, PHYS 400, and PHYS 403		
Total Hours		8185-86
[±]	except MATH 400, MATH 404, MATH 499, and MTHE 513-MTHE 516.	

Available via distance: 50% or more of curricular requirements cannot be completed via distance

Geographical area: Moscow, CDA

Rationale: Assessment of the BSCS program follows and complies with the requirements from the ABET Computing Accreditation Commission (CAC) for Computer Science programs. The ABET CAC criteria for accrediting computer science programs (CSAB) was updated in October 2017 and will apply to reviews starting with the 2019-2020 accreditation cycle. These new student learning outcomes and assessment plan are intended to enable continued compliance with the ABET CAC accreditation requirements. The Student Learning Outcomes listed above are the same as the ones required within the latest ABET CAC accreditation requirements.

Addition of: CS 105 - Computing Paths and Professions (1 credit) as a required course: This course is intended to ensure that new Computer Science students know of and have access to all resources needed to succeed in the program and also encourage

cohort building. In addition, computing profession and academic paths will be introduced in this course. Resource impact: The CS department has added several new full-time faculty members within the last few years and no significant changes to the curriculum have been made since.

Addition of: CS 360 - Database Systems (3 credits) as a required course: This addition is intended to comply with the new ABET-CAC-CSAB curricular requirements for Computer Science programs which added required coverage of “information management”.

Resource impact: The CS-360 course is already taught in the department on a yearly basis as a technical elective; under this proposal this course would become a required course.

Removal of UPDV Mathematics Elective (3 credits): The ABET CAC criteria for accrediting computer science programs was updated in 2017. These latest ABET CAC accreditation requirements mandatory starting 2019-2020 are: “Mathematics: At least 15 semester credit hours (or equivalent) that must include discrete mathematics and must have mathematical rigor at least equivalent to introductory calculus. The additional mathematics might include course work in areas such as calculus, linear algebra, numerical methods, probability, statistics, or number theory. (ABET-CAC-CSAB-2017-Ver2)” Within this new BSCS proposal required mathematics courses would be: MATH 170 - Calculus I - 4 credits (Complies with UI General Education Reqs.: J-3-d), MATH 175 - Calculus II - 4 credits, MATH 176 - Discrete Mathematics - 3 credits, MATH 330 - Linear Algebra - 3 credits, and STAT 301 - Probability and Statistics - 3 credits. These comply with the above quoted requirements.

4. Make the following curricular changes the **Graduate Academic Certificate in Secure and Dependable Systems**:

Note: A grade of ‘B’ or higher is required in all coursework for this academic certificate.

CS 536	Advanced Information Assurance Concepts	3
CS 438	Network Security	3
or CS 538	Network Security	3
<u>CS 547</u>	<u>Computer and Network Forensics</u>	<u>3</u>
Select 69 credits of Electives:		69
CS 448	Survivable Systems and Networks	
CS 449	Fault-Tolerant Systems	
CS 504	Special Topics	
<u>CS 539</u>	<u>Applied Security Concepts</u>	
<u>CS 544</u>	<u>Supervisory Control and Critical Infrastructure Systems</u>	
<u>Or ECE 544</u>		
CS 548	Survivable Systems and Networks	
CS 549	Fault/Tolerant Systems	
<u>ECE 569</u>	<u>Resilient Control of Critical Infrastructure</u>	
Total Hours		12 <u>21</u>

Courses to total ~~12~~18 credits for this certificate

Available via distance: More than 50% but less than 100% of curricular requirements can be completed via distance education.

Geographical area: Moscow, CDA, Idaho Falls

Rationale: Over the past several years there have been changes to our course offerings. These changes update the Graduate Academic Certificate in Secure and Dependable Systems to match those changes. In addition, we are adding an undergraduate Cybersecurity certificate, and thus removed the option of using undergraduate courses to satisfy this certificate.

The University of Idaho has been designated a National Center for Academic Excellence in Information Assurance and Cyber Defense (CAE/CD) since 1999. Changes to the assessment process for this designation require that we track all students that select cybersecurity (information assurance) studies. We need a process to ensure that they all follow the same educational path and that their selection is designated on their academic transcripts.

ELECTRICAL AND COMPUTER ENGINEERING

1. Add the following course:

CHE 582 Spent Nuclear Fuel Management and Disposition

Cross-listed with NE 582

The management of nuclear fuel after removal from a nuclear reactor; storage options, recycle and recovery of uranium and other radionuclides, geological repositories and related topics.

Prereq: Permission

Available via distance: Yes

Geographical area: Moscow, Idaho Falls

Rationale: Content of course supports the focus area electives within the NE program and can be used for electives within CHE. Course is already taught by an NE & CHE related instructor so no additional workload will result from the crosslisting.

2. Change the following courses:

ECE 240 Digital Logic

3 credits

Number systems, truth tables, logic gates, flip-flops, combinational and synchronous sequential circuits; intro to digital systems and basic microprocessor architecture; ~~certification exam not reqd.~~

Prereq: PHYS 212 and PHYS 212L

Coreq: ECE 241.

Rationale: The certification exam hasn't been used in many years and is not mentioned anywhere else in the ECE catalog section.

ECE 241 Logic Circuit Lab**1 credit**

~~Open lab Lab~~ to accompany ECE 240. ~~Design and construction of combinational and synchronous sequential logic circuits; certification exam not reqd.~~

Prereq: PHYS 212 and PHYS 212L**Coreq:** ECE 240.

Rationale: ECE 241 has not been run as an “open” lab for many years. Instead, there is an assigned time with a TA. This description is consistent with similar ECE courses in the catalog, e.g. ECE 341.

ECE 340 Microcontrollers**3 credits**

Introduction to use of embedded microcontrollers and microprocessors; processor architecture; ~~assembly language~~ programming; use of development systems and/or emulators for system testing and debugging; software and hardware considerations of processor interfacing for I/O and memory expansion; programmed and interrupt driven I/O techniques. ~~Three lec a wk.~~

Prereq: ECE 212, ECE 213, ECE 240, ECE 241, and CS 112 or CS 120**Coreq:** ECE 341.

Rationale: (1) Compiler advances and shortened development times have reduced the need for students to do extensive assembly language programming.
 (2) Other 300-level courses, e.g., ECE 350, do not list the lecture schedule, as sometimes a course might be scheduled for Tuesday/Thursday.

ECE 491 Senior Seminar**0 credits**

Technical topics, professional ethics, employment practice, and interviewing. One lec a wk; ~~one 3-6 day field trip may be required.~~ Graded P/F.

Rationale: Field trips associated with ECE 491 have not be required or offered for many years.

ENGINEERING MANAGEMENT

1. Change the following course:

EM 510 Engineering ~~and Technology~~ Management Fundamentals**3 credits**~~Cross-listed with TM 510.~~

Fundamental principles of engineering management addressing management theory applied to the engineering environment; management processes and techniques; attitudes that facilitate the leadership role of the engineering manager in an engineering organization; ~~team taught by business and engineering faculty.~~

Prereq: Instructor Permission.

Available via distance: Yes

Geographical area: Moscow, Boise

Rationale: Technology Management is a separate and unique program. TM will be creating and offering their own course, TM510.

TECHNOLOGY MANAGEMENT

1. Change the following course:

TM 510 ~~Engineering and~~ Technology Management Fundamentals

3 credits

~~Cross-listed with EM 510:~~

~~Fundamental principles of engineering management addressing management theory applied to the engineering environment; management processes and techniques; attitudes that facilitate the leadership role of the engineering manager in an engineering organization; team-taught by business and engineering faculty.~~ Fundamental principles of technology management. The course focuses on management theory and techniques associated primarily with project management, management theory applied to high technology environments; management processes and techniques; project leadership role of the engineering manager in technology organizations; team-taught by business, engineering, and technology management faculty.

Prereq: Permission.

Available via distance: Yes

Geographical area: Moscow, Idaho Falls, EO to various locations

Rationale: The course used to be cross-listed with EM 510 and it was offered in both Engineering Management and Technology Management programs. The two programs decided to offer 2 similar, but different, courses that cover content and topics that are better aligned to the needs of each program.

MECHANICAL ENGINEERING

1. Change the following courses:

ME 430 Senior Lab

3 credits

Detailed lab investigation of engineering problem; statistical design of experiments; application of engineering principles to analyze experimental data; technical report writing; oral communication skills. One lec and four hrs of lab a wk.

Prereq: ME 313, ~~and~~ ME 330 and ME 341.

Available via distance: No

Geographical area: Moscow

Rationale: Adjusting pre-reqs to load level and ensure that students taking the course are seniors in the ME program

ME 435 Thermal Energy Systems Design**3 credits**

Application of fluid mechanics, thermodynamics and heat transfer in the design of thermal energy systems; topics include thermal energy system component analysis and selection, component and system simulation, dynamic response of thermal systems, and system optimization.

Prereq: [ME 341](#) and ME 345.

Available via distance: No

Geographical area: Moscow

Rationale: Changing of pre-reqs to load level and ensure that the students taking the class are seniors in the ME program

ME 450 [Fundamentals of Computational Fluid Dynamics](#)**3 credits**

~~Joint-listed ME 550.~~

Governing equations of fluid flow; fundamentals of turbulence modeling; accuracy and stability of discretization schemes; verification and validation; boundary and initial conditions; grid generation; CFD post-processing. Application of CFD software (ANSYS FLUENT) through five hands-on CFD Labs including internal viscous pipe flows, external flows over a 2D airfoil and a circular cylinder, and flows in a 2D driven cavity. ~~Additional projects/assignments required for graduate credits. Cooperative: open to WSU degree seeking students.~~

Prereq: ENGR 335 and MATH 330

Available via distance: Yes

Geographical area: Moscow, Idaho Falls

Rationale: Due to a limited time, majority of the current ME 4/550 CFD contents are developed at the undergraduate level that focus on simple, two-dimensional, and single-phase flows. However, graduate students need learn more advanced CFD techniques to solve real and more complex problems in engineering applications like those in their research projects. To change ME 4/550 to be at undergraduate students only and create a new course (in a separate course change form) "ME 550 Advanced CFD" at graduate level will resolve this issue. Additionally, current ME 4/550 is offered every Spring whereas some capstone design teams ME 424 Mechanical System Design I need to use CFD to help their designs starting in the fall. To resolve this, the proposed modification will allow students to take ME 450 and ME 550 in fall and spring, respectively.

ME 550 [Advanced Computational Fluid Dynamics](#)**3 credits**

~~Joint-listed ME 450.~~

~~Governing equations of fluid flow; fundamentals of turbulence modeling; accuracy and stability of discretization schemes; verification and validation; boundary and initial conditions; grid generation; CFD post-processing. Application of CFD software (ANSYS FLUENT) through five hands-on CFD Labs including internal viscous pipe flows, external flows over a 2D airfoil and a circular cylinder, and flows in a 2D~~

~~driven cavity. Additional projects/assignments required for graduate credits.~~ [Navier-Stokes and energy equations of fluid flow; advanced turbulence models; multiphase models; direct numerical simulations; advanced numerical methods; solution verification and validation; advanced CFD techniques; grid generation for complex geometries; CFD post-processing; fluid-structure interaction. Application of CFD software through hands-on CFD Labs including OpenFoam solutions to canonical flows studied in ME 450 and ANSYS Multiphysics or OpenFoam solutions to 2D free-surface flows, heat transfer of a 3D insulated box, sliding and dynamic meshes for two cars crossing each other, and fluid-structure interaction for a 2D balloon.](#) Cooperative: open to WSU degree seeking students.

Prereq: ENGR 335 and MATH 330

Available via distance: No

Geographical area: Moscow

Rationale: Due to a limited time, majority of the current ME 4/550 CFD contents are developed at the undergraduate level that focus on simple, two-dimensional, and single-phase flows. However, graduate students need learn more advanced CFD techniques to solve real and more complex problems in engineering applications like those in their research projects. To change ME 4/550 to be at undergraduate students only and create this new course "ME 550 Advanced CFD" at graduate level will resolve this issue. Additionally, current ME 4/550 is offered every Spring whereas some capstone design teams ME 424 Mechanical System Design I need to use CFD to help their designs starting in the fall. To resolve this, the proposed modification will allow students to take ME 450 and ME 550 in fall and spring, respectively.

2. Make the following curricular changes to the Mechanical Engineering Major (B.S.M.E.):

This program is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.com>
~~111 Market Place, Suite 1050, Baltimore, MD 21202-4012 telephone: 410-347-7700.~~

Note: Pre-advising is required to register in any ME course.

Required course work includes the university requirements (see regulation J-3), completion of the Fundamentals of Engineering (FE) examination and:

CHEM 111	Principles of Chemistry I	3
CHEM 111L	Principles of Chemistry I Laboratory	1
COMM 101	Fundamentals of Public Speaking	2
ENGL 317	Technical Writing	3
ENGR 210	Engineering Statics	3
ENGR 220	Engineering Dynamics	3
ENGR 240	Introduction to Electrical Circuits	3
ENGR 335	Engineering Fluid Mechanics	3
ENGR 350	Engineering Mechanics of Materials	3
MSE 201	Elements of Materials Science	3
MATH 170	Analytic Geometry and Calculus I	4
MATH 175	Analytic Geometry and Calculus II	4
MATH 275	Analytic Geometry and Calculus III	3
MATH 310	Ordinary Differential Equations	3

MATH 330	Linear Algebra	3
ME 123	Introduction to Mechanical Design	3
ME 223	Mechanical Design Analysis	3
ME 301	Computer Aided Design Methods	3
ME 313	Dynamic Modeling of Engineering Systems	3
ME 322	Mechanical Engineering Thermodynamics	3
ME 325	Machine Component Design I	3
ME 330	Experimental Methods for Engineers	3
ME 341	Intermediate Mechanics of Materials	3
ME 345	Heat Transfer	3
ME 416	FE Exam Review	1
ME 424	Mechanical Systems Design I	3
ME 426	Mechanical Systems Design II	3
ME 430	Senior Lab	3
ME 435	Thermal Energy Systems Design	3
PHIL 103	Ethics	3
PHYS 211	Engineering Physics I	3
PHYS 211L	Laboratory Physics I	1
PHYS 212	Engineering Physics II	3
PHYS 212L	Laboratory Physics II	1
Select one from the following:		3-4
ECON 201	Principles of Macroeconomics	
ECON 202	Principles of Microeconomics	
ECON 272	Foundations of Economic Analysis	

Technical Elective requirements for Mechanical Engineering

Select 15 credits from the following: ¹		15
BE 421	Image Processing and Computer Vision	
BE 425	Introduction to Biomedical Engineering	
BE 462	Electric Power and Controls	
ENTR 414	Entrepreneurship	
ENGR 360	Engineering Economy	
ENGR 428	Numerical Methods	
ENTR 414	Entrepreneurship	
ENTR 415	New Venture Creation	
MATH 371	Mathematical Physics	
MATH 420	Complex Variables	
MATH 428	Numerical Methods	
MATH 432	Numerical Linear Algebra	
MATH 437	Mathematical Biology	
MATH 451	Probability Theory	
MATH 452	Mathematical Statistics	
MATH 453	Stochastic Models	
MATH 471	Introduction to Analysis I	
MATH 472	Introduction to Analysis II	

MATH 480	Partial Differential Equations
ME 401	Engineering Team Projects
ME 404	Special Topics
ME 410	Principles of Lean Manufacturing
ME 412	Gas Dynamics
ME 413	Engineering Acoustics
ME 414	HVAC Systems
ME 417	Turbomachinery
ME 420	Fluid Dynamics
ME 421	Advanced Computer Aided Design
ME 422	Applied Thermodynamics
ME 423	Human Factors and Ergonomics in Product Design
ME 425	Machine Component Design II
ME 433	Combustion Engine Systems
ME 436	Sustainable Energy Sources and Systems
ME 438	Sustainability and Green Design
ME 444	Air Conditioning Engineering
ME 450	Fundamentals of Computational Fluid Dynamics
ME 451	Experimental Methods in Fluid Dynamics
ME 452	TechVentures: High Technology Entrepreneurship
ME 458	Finite Element Applications in Engineering
ME 461	Fatigue and Fracture Mechanics
ME 464	Robotics: Kinematics, Dynamics, and Control
ME 472	Mechanical Vibrations
ME 481	Control Systems
ME 490	Solid Modeling, Simulation and Manufacturing Capstone
ME 519	Fluid Transients
ME 521	Design Synthesis with Solid Modeling
ME 525	Advanced Heat Transfer
ME 529	Combustion and Air Pollution
ME 539	Advanced Mechanics of Materials
ME 540	Continuum Mechanics
ME 541	Mechanical Engineering Analysis
ME 544	Conduction Heat Transfer
ME 547	Thermal Radiation Processes
ME 548	Elasticity
ME 549	Finite Element Analysis
ME 550	Advanced Computational Fluid Dynamics
ME 571	Building Performance Simulation for Integrated Design
ME 580	Linear System Theory
MSE 412	Mechanical Behavior of Materials
MSE 415	Materials Selection and Design
MSE 417	Instrumental Analysis
MSE 423	Corrosion
MSE 438	Fundamentals of Nuclear Materials

NE 437	Radiation Effects on Materials
NE 438	Fundamentals of Nuclear Materials
NE 450	Principles of Nuclear Engineering
OM 378	Project Management
OM 439	Systems and Simulation
OM 456	Quality Management
PHYS 305	Modern Physics
PHYS 351	Introductory Quantum Mechanics I
PHYS 411	Advanced Physics Lab
PHYS 428	Numerical Methods
PHYS 443	Optics
PHYS 464	Materials Physics and Engineering
PHYS 465	Nuclear and Particle Physics
PHYS 484	Astrophysics
STAT 301	Probability and Statistics
STAT 431	Statistical Analysis
Any Approved 400/500 Level Course in another Engineering Discipline	
A maximum of 6 credits of the following may be selected:	
ME 307	Group Mentoring I
ME 308	Group Mentoring II
ME 401	Engineering Team Projects
ME 407	Group Mentoring III
Total Hours	113-114

¹ Fifteen credits of technical electives are required from the list. The breakdown of credits will be as follows: six credits must be an ME upper division course, three credits must be an upper division Math, Statistics or Physics course, the remaining six credits may be any course listed.

Courses to total 128 credits for this degree, not counting ENGL 101 , MATH 143 , and other courses that might be required to remove deficiencies.

Rationale: • The curricular change includes the correct identification of the accreditation body for our program which is very particular in how they are cited in college catalogs. The change represents the approved manner of citing ABET.

- The curricular change explicitly identifies options for additional technical electives across the college and the university. Many of these have been used by previous students and this has caused us to process a large number course substitution waivers for additional technical electives that will be minimized with the expanded listing. Our general guidelines for technical elective credits within our program is not changed.
- The curricular change specifically adds two non-engineering freshman level courses to our junior certification because. We have found that some students are postponing taking these courses which add greater value when taken earlier in their academic program. Certification courses need to be completed before students can take 300-level courses in our major.
- The curricular change helps to load-level enrollment in heavily subscribed senior level courses by requiring ME 341 as a pre-req for ME 435 and ME 430. We have observed that there are a few students who are really first semester juniors enrolled in these courses each fall,

depriving graduating seniors of a seat in these required courses during the course registration process. We have intervened to remove some of these students have them take ME 435 and ME 430 in one of the many open slots in their schedule later in their program. The new rule will make these interventions unnecessary.

- The learning outcomes are assessed each semester according to a plan approved by the faculty in select courses approved by the ABET departmental committee. Assessment reports are submitted to the ABET department committee each semester. The committee reviews these forms and presents the results to the ME faculty. Conclusions and plans of action are discussed and implemented each semester following discussions in the ME faculty meetings. These reports are also kept for the periodic ABET evaluation that the ME department goes through every six years.

NUCLEAR ENGINEERING

1. Reactivate the following courses:

NE 582 Spent Nuclear Fuel Management and Disposition

3 credits

Course offered only in Idaho Falls.

[Cross-listed with CHE 582](#)

The management of nuclear fuel after removal from a nuclear reactor; storage options, recycle and recovery of uranium and other radionuclides, geological repositories and related topics.

Prereq: Permission

Available via distance: Yes

Geographical area: Idaho Falls

Rationale: Course had not been offered for several years and so became dormant. Registrar's Office allowed it to be offered once from dormant status.

The curriculum for the program has been reviewed and realigned by the faculty and Director as part of the assessment process. It has been determined that the content of this course is missing in the courses needed for a rigorous graduate nuclear engineering degree.

The course is already taught by a CHE related instructor and does not create an added workload.

NE 585 Nuclear Fuel Cycles

3 credits

Cross-listed with MSE 585

Processes to support the existing LWR fuel cycle. Alternative fuel cycles including U-233, Pu239 and mixed oxide fuels, and advanced reactor concepts. Recycling and recovery of nuclear materials, with emphasis on traditional fast reactor recycle.

Prereq: Permission

Available via distance: Yes

Geographical area: Idaho Falls

Rationale: Course had not been offered for several years and so became dormant. Registrar's Office allowed it to be offered once from dormant status.

The curriculum for the program has been reviewed and realigned by the faculty and Director as part of the assessment process. It has been determined that the content of this course is missing in the courses needed for a rigorous graduate nuclear engineering degree.

It has been added to the regular rotation of courses and as such does not create an added workload.

2. Add the following courses:

NE 513 Nuclear Security Science

3 credits

An engineering course on threat and risk informed nuclear security covering topics including: physical protection, facility characterization, consequence analysis, access control/delay, insider threats, security culture, transportation security, radiological crime scene, and nuclear forensics.

Prereq: Science or Engineering background or instructor permission

Available via distance: Yes

Geographical area: Moscow, Online

Rationale: This course is being proposed as part of a new Nuclear Security Graduate Certificate that is being proposed to the State Board of Education to foster collaboration between UI, ISU, BSU, and U Wyoming through the Center for Advanced Energy Studies (CAES). Each campus will offer one course in the program to build a unique educational collaboration.

NE 536 Electrochemical Engineering

3 credits

Cross-listed with CHE 536

Application of chemical engineering principles to electrochemical systems; thermodynamics, kinetics, and mass transport in electrochemical systems; electrochemical process design.

Available via distance: Yes

Geographical area: Moscow, Idaho Falls

Rationale: Content of course supports the focus area electives within the NE program and can be used for electives within CHE. Course is already taught by an NE & CHE related instructor so no additional workload will result from the crosslisting. [CHE 536 currently exists]