College of Engineering
Proposed Catalog Changes
Effective Summer 2018

BIOLOGICAL ENGINEERING

1. Change the following course:

BE 361 Transport Processes in Biological Systems (3 cr)
~~Heat and mass transfer processes applied to analysis of biological systems and related equipment and processes.~~ The course intends to familiarize students with transport phenomena processes involved in bio-related fields spanning from agricultural to environmental and medical to pharmaceutical.
Prereq: Engr 320 and Engr 335, ~~Math 310~~

Available via distance: No
Geographical Area: Moscow
Rationale: The contents of this required course need to be modified to cover biotransport processes ranging from agricultural to environmental and medical to pharmaceutical. With several new hires in the department, no additional workload will be added.

CHEMICAL AND MATERIALS ENGINEERING

1. Add the following courses:

CHE 440 Applied Mathematics in Chemical Engineering (3 cr)
Mathematical approaches to modeling chemical behavior in transport, separation, reactor, and process systems.
Prereq: CHE 341 or permission

Available via distance: No
Geographical Area: Moscow, Idaho Falls
Rationale: This course has already been taught as a Special Topics course and is now ready to become a permanent catalog course. A recent review of similar ChE curriculum in the US by our Department Advisory Board found that our program currently offers too few upper-division ChE electives—3 credits, whereas the average requirement across those review programs was 12 credits. The permanent addition of this elective will be taught in rotation with other offerings and will not represent an overall increase in teaching workload for the department. It is a common elective in many ChE programs and is sometimes even a required course. This course and others like it are also needed to update our curriculum for student options toward modern industry needs that may be satisfied through our existing CHE and technical elective requirements for all BS students.

CHE 455 Surfaces and Colloids (3 cr)
Chemical and physical phenomena near material interfaces and behaviors of colloidal particles in dispersing media.
Prereq: CHE 326 or CHEM 305 or permission

Available via distance: No

Geographical Area: Moscow
Rationale: A recent review of similar ChE curriculum in the US by our Department Advisory Board found that our program currently offers too few upper-division ChE electives—3 credits, whereas the average requirement across those review programs was 12 credits. This addition will be taught in rotation with other offerings and will not represent an overall increase in teaching workload for the department. Similar special topics courses in this area have already been taught in previous years, and so this needs to be added as a permanent course in order to be offered again. It is a common elective in many ChE programs and is sometimes even a required course. This course and others like it are also needed to update our curriculum for student options toward modern industry needs that may be satisfied through our existing CHE and technical elective requirements for all BS students. It is likely to be developed into an Engineering Outreach course in future years.

MSE 313L Physical Metallurgy Laboratory (1 cr)
Metallographic principles and practices, hardness testing, structure-property correlations. One 2-hr lab per week.
Prereq or Coreq: MSE 313

Available via distance: No
Geographical Area: Moscow
Rationale: This 1-credit laboratory course is separated out of the 4-credit Physical Metallurgy course to add flexibility to the MSE curriculum. Now the lecture course MSE 313 (3 cr.) can be offered through the Engineering Outreach. Furthermore, the logistical challenges with the lab class will not be an impeding factor in offering the course.

2. Reactivate and change the following courses:

MSE J421/J521 Light Metals (3 cr)
Principles behind the physical and extractive metallurgy of the light metals Al, Mg, Ti, Be; discussion of characteristics and applications of alloys based on these metals. Additional projects/assignments reqd for grad cr. Recommended Preparation: MSE 313. ~~(Spring, Alt/yrs)~~

MSE 521 Light Metals (3 cr)
See MSE J421/J521.

Available via distance: Yes
Geographical Area: Moscow, Idaho Falls, Engineering Outreach
Rationale: The course went dormant, though it is still listed in the 2016-17 General Catalog. Because of the interest to MSE students in this subject, the department would like to bring it out of dormancy. The course is also going to be offered through the Engineering Outreach and to Idaho Falls campus via compressed video.

3. Change the following course:

MSE 313 Physical Metallurgy (~~4~~3 cr)
Theory, structure, and properties of materials. (Fall only)
Prereq: MSE 201

Available via distance: Yes
Geographical Area: Moscow
Rationale: Currently, Physical Metallurgy is a 4-credit course, which includes one credit of laboratory. However, this does not provide the flexibility in offering the laboratory section separately. In the future, we plan to offer the lecture via Engineering Outreach and to other campuses such as Idaho Falls, requiring the lab component to be separate. Thus, the existing course becomes a 3-credit lecture only with a new 1-credit course for the lab only, which is also being requested with an appropriate "add" form. Though it is not currently available for Distance Ed (see above), that is the plan in future years.

4. Make the following curricular changes to the **Major in Materials Science and Engineering** (B.S.M.S.E.):

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

CHEM 111	Principles of Chemistry I	4 cr
CHEM 112	Principles of Chemistry II	5 cr
CHEM 305	Physical Chemistry	3 cr
CHEM 307	Physical Chemistry Lab	1 cr
ENGL 317	Technical Writing	3 cr
ENGR 210	Engineering Statics	3 cr
ENGR 240	Introduction to Electrical Circuits	3 cr
ENGR 335	Engineering Fluid Mechanics	3 cr
ENGR 350	Engineering Mechanics of Materials	3 cr
MATH 170	Analytic Geometry and Calculus I	4 cr
MATH 175	Analytic Geometry and Calculus II	4 cr
MATH 275	Analytic Geometry and Calculus III	3 cr
MATH 310	Ordinary Differential Equations	3 cr
MSE 101	Introduction to Metallurgy and Materials Science	2 cr
MSE 201	Elements of Materials Science	3 cr
MSE 308	Thermodynamics of Materials	3 cr
MSE 313	Physical Metallurgy	~~4~~3 cr
MSE 313L	Physical Metallurgy Laboratory	1 cr
MSE 340	Transport and Rate Processes I	4 cr
MSE 412	Mechanical Behavior of Materials	3 cr
MSE 413	Phase Transformation and Kinetics	3 cr
MSE 417	Instrumental Analysis	3 cr
MSE 423	Corrosion	3 cr
MSE 427	Ceramics Materials	3 cr
MSE 432	Fundamentals of Thin Film Fabrication	3 cr
MSE 434	Fundamentals of Polymeric Materials	3 cr
MSE 453	Process Analysis & Design I	3 cr
MSE 454	Process Analysis & Design II	3 cr
MSE 456	Metallic Materials	3 cr
MSE 464	Materials Physics and Engineering	3 cr
PHIL 103	Ethics	3 cr
PHYS 211	Engineering Physics I	3 cr

PHYS 212	Engineering Physics II	3 cr
PHYS 212L	Laboratory Physics II	1 cr
STAT 301	Probability and Statistics	3 cr

Chemical/Analysis Elective (3 cr):

CHE 223	Material and Energy Balances	3 cr
CHEM 275	Carbon Compounds	3 cr
CHEM 277	Organic Chemistry I	3 cr
CHEM 306	Physical Chemistry	3 cr
ENGR 428	Numerical Methods	3 cr

~~**Computer Science Elective in a Programming Language (3 cr):**~~

~~CS~~	~~Computer Science Elective~~	~~3 cr~~

Economics Elective (3 cr):

ECON	Economics Elective	3 cr

Humanities and Social Science Electives (6 cr):

	Humanities and Social Science Electives	6 cr

MSE or CHE Technical Elective (3 cr):

	MSE or CHE Elective	3 cr

Must be numbered 300 or greater.

Upper-Division Technical Elective (3 cr):

	Technical Electives in Math, Science, or Engineering	3 cr

Must be numbered 300 or greater, excluding any 398, 498, or 598 Internship.

Courses to total 125 credits for this degree, not counting ENGL 101, any 398 (Internship), any 498 (Internship), any 598 (Internship),or mathematics courses numbered lower than MATH 170, and other courses that might be required to remove deficiencies.

Students majoring in materials science and engineering must earn a grade of C or better in each of the following courses before registration is permitted in upper-division materials science and engineering courses: CHEM 111 and CHEM 112, ENGR 210 and ENGR 335, MATH 275 and MATH 310, MSE 201, and PHYS 211 and PHYS 212.

A passing grade is required in each of the following courses before registration is permitted in upper-division materials science and engineering courses: ~~computer science elective,~~ ENGL 102, MATH 170 and MATH 175, and MSE 101.

Any student majoring in materials science and engineering may accumulate no more than four grades of D or F in UI mathematics, science, or engineering courses that are used to satisfy junior certification requirements. Included in this number are multiple repeats in a single class or single repeats in multiple classes. A warning will be issued in writing to students who have accumulated two grades of D or F in UI mathematics, science, or engineering courses used to satisfy curricular requirements.

An average GPA of at least 2.0 is required for all materials science and engineering courses used to satisfy the curricular requirements.

Available via distance: 50% or more of curricular requirements cannot be completed via distance
Geographical Area: Moscow
Rationale: This change corresponds to more appropriate and broader options content for elective considerations in the BS MSE curriculum for students based on recent advisory board and faculty review of similar curricula and the current and future needs of MSE graduates. Our department advisory board conducted a program comparison in Spring 2017 of 58 US universities with BS ChE and/or BS MSE programs. They found four similar MSE programs that required a separate programming course, one of which was 3 credits, the others were 2 and 1 credit only. The general consensus is that embedded software applications vertically integrated across the curriculum is more common and more robust as training than having a stand-alone computer programming elective in early years (particularly, in C++) that cannot be applied directly to materials science and engineering analysis and problem-solving, where much more sophisticated software is now required. By comparison, 80% of MSE programs reviewed required organic chemistry, which we are adding as two elective options. MSE programs had an average of 7 technical electives and 7 upper-division MSE electives, whereas we only allow two electives total. The conclusion of faculty, students, and advisory board was that our curriculum is far too rigid to provide flexibility for students to build emphases toward a particular industry or application area. Other options currently available to our MSE students of CHE 223, CHEM 306, and ENGR 428 are helpful "gateway" courses toward minors and double majors and as prerequisites for other courses, especially for building better synergy with the BS ChE program (also in our department) to make upper-division ChE electives accessible to MSE students.

CIVIL AND ENVIRONMENTAL ENGINEERING

1. Change the following courses:

CE 460 Geotechnical Engineering Design (3 cr)
Applications of soil mechanics in design of shallow and deep foundations, earth retaining structures, excavations, and soil exploration.
Prereq: CE 360~~; and CE 441 or CE 444;~~ or Permission. A minimum grade of 'C' or better is required for all pre/coreqs.

Available via distance: No
Geographical Area: Moscow
Rationale: The prerequisite of a structural engineering course (CE 441 or CE 444) is not required as students are better prepared in earlier courses in the CEE curriculum.

CE 484 Engineering Law and Contracts (~~2~~3 cr)
Project engineering techniques for planning, scheduling, and controlling typical engineering and construction projects. Contract law and application to engineering services agreements and construction contracts; preparing technical specifications, torts, professional liability, and alternate dispute resolution.

Prereq: Senior standing in engineering

Available via distance: Yes
Geographical Area: Moscow, Engineering Outreach
Rationale: Title change is to clean up error, course is 3 credits.

2. Drop the following course:

CE 482 Project Engineering (3 cr)
Same as EM 482 and TM 482. Modern project engineering techniques for planning, scheduling, and controlling typical engineering and construction projects. Linear programming and other optimization techniques as applied to resource allocation. Computer applications are emphasized and appropriate software used throughout the course.
Prereq: ((Stat 251, Stat 301, or Equivalent) and Senior standing) or Permission. A minimum grade of 'C' or better is required for all pre/coreqs.

Available via distance: Yes
Rationale: CEE faculty have determined this course delivers redundant content to CE494 and CE484, and thus is no longer needed in our curriculum.

COMPUTER SCIENCE

1. Add the following courses:

CS (s) J431/J531 CyberCorps(R) SFS Professional Development (1 cr)

CS (s) 531 CyberCorps(R) SFS Professional Development (1 cr)

Available via distance: No
Geographical Area: Moscow
Rationale: The number change will help avoid misunderstandings with the CS-400/501: Computer Science Seminar course which is a required course in the Computer Science program. The title change will help match the new name used by the U.S. Government for the CyberCorps(R) Scholarship for Service program.

The CS-400/501 Scholarship/Service seminar course has been taught for many years. The requested change is to ensure a clearer separation from the CS-400/501 Computer Science Seminar course numbers. The CS-400/501 seminar is a required course within the Computer Science program. The referred SEM:Scholarship/Service (old name) CyberCorps(R) Prof. Dev. (new name) course is required only for students in the CyberCorps(R) program. This separation will help avoid misunderstandings and accurate accountability within the degree audit. The current SEM: Scholarship/Service course is not listed on the course catalog [CS 400 and CS 501 are both listed in the catalog]. The new name CyberCorps(R) Prof. Dev. course should also not be listed on the general course catalog. This course can be taken multiple times.

CS J444/J544 Supervisory Control and Critical Infrastructure Systems
See ECE J444/J544.

CS 544 Supervisory Control and Critical Infrastructure Systems (1 cr)
See CS J444/J544.

Available via distance: No
Geographical Area: Moscow
Rationale: This course has been previously co-taught with ECE and CS faculty. The course is seen as an important course in computer security and we would like to make the course easily available for credit in the CS degree programs.

CS 543 Embedded Systems (3 cr)
See CS J443/J543.

Available via distance: No
Geographical Area: Moscow
Rationale: We have a new faculty member who has embedded systems as their specialty and we want to take advantage of his skills. This is resurrecting a dead course so the course number is known.

2. Reactivate the following course:

CS J424/J524 Advanced Computer Graphics (3 cr)
Graphical user interfaces; rendering for realism including shading, shadows and textures; fractals; raster displays, pixmaps, and antialiasing; 3D curves and surfaces; color theory; hidden surfaces; ray tracing; games. Additional work required for graduate credit. (Spring only)
Prereq: CS 324, Math 175

Available via distance: No
Geographical Area: Moscow
Rationale: Computer graphics is an important topic for the games and entertainment industry. With an increased number of faculty in the computer science department we believe we can teach this course again. This is resurrecting a dead course so the course number is known.

3. Reactivate and change the following course:

CS 524 Advanced Computer Graphics (3 cr)
See CS J424/J524. ~~Graphical user interfaces; rendering for realism including shading, shadows and textures; fractals; raster displays, pixmaps, and antialiasing; 3D curves and surfaces; color theory; hidden surfaces; ray tracing; games. (Spring only)~~
~~**Prereq:** CS 324, Math 175~~

Available via distance: No
Geographical Area: Moscow
Rationale: Computer graphics is an important topic for the games and entertainment industry. With an increased number of faculty in the computer science department we believe we can teach this course again. This is resurrecting a dead course so the course number is known.

[Editor's note: This course was already joint listed, but the 524 listing did not reflect this]

4. Reactivate and joint-list the following course:

CS J443/J543 Embedded Systems (3 cr)
Interfacing to an embedded system processor. Development of the processor's hardware-software interface. Application software development. Use of C and assembly language in device driver design, monitor-debugger, and real-time kernel. Regular laboratory assignments. (Fall only)
Prereq: CS 383

Available via distance: No
Geographical Area: Moscow
Rationale: We have a new faculty member who has embedded systems as their specialty and we want to take advantage of his skills. This is resurrecting a dead course so the course number is known.

ELECTRICAL AND COMPUTER ENGINEERING

1. Joint-list the following courses:

ECE J444/J544 Supervisory Control and Critical Infrastructure Systems (3 cr)
Same as CS J444/J544. Principles of network-based distributed real-time control and critical infrastructure systems. Integration of dedicated control protocols with wide area networks (e.g. the Internet). Issues of reliability, cost, and security. Application to selected industries, such as electric power distribution and waste and water management. Recommended preparation: ECE 340, CS 240, ME 313, CE 330, or CE 372. (Spring, alt/yrs.)
Prereq: Senior or Graduate standing in the College of Engineering

ECE 544 Supervisory Control and Critical Infrastructure Systems (3 cr)
See ECE J444/J544.

Available via distance: No
Geographical Area: Moscow
Rationale: This course has been previously co-taught with ECE and CS faculty. The course is seen as an important course in computer security and we would like to make the course easily available for credit in the CS degree programs.

2. Change the following courses:

ECE 452 Communication Systems (3 cr)
Introduction to modern communication systems; baseband pulse and data communication systems; communication channels and signal impairments; filtering and waveform shaping in the time and frequency domain; carrier-modulation for AM and FM transmission; bandpass digital and analog communication systems; comparison of system performance. Cooperative: open to WSU degree-seeking students. (Alt/yrs)
Prereq: ECE 450 and (STAT 301 or MATH 451)

Available via distance: Yes
Geographical Area: Moscow, Engineering Outreach
Rationale: The course content requires adequate preparation in probability theory, which justifies adding STAT 301 or MATH 451 as the prerequisites of ECE 452.

ECE 480 EE Senior Design I (3 cr)
The capstone design sequence for electrical engineering majors. Course topics include design, research, simulation, and experimental methods; specifications, prototyping, troubleshooting and verification; report writing, documentation and oral presentations. Topics are considered in the context of a major design project involving a team of students. Projects incorporate realistic engineering constraints; i.e. environmental, sustainability, manufacturability, ethical, safety, social and political considerations.
Prereq: ECE 240, ECE 241, ECE 310, ECE 311, ECE 320, ECE 321, ECE 330, ECE 331, ECE 340, ECE 341, ECE 350, and ECE 351 ~~and Stat 301~~; or Permission
Coreq: STAT 301

Available via distance: Yes
Geographical Area: Moscow, Engineering Outreach
Rationale: The EE Senior Design sequence has evolved such that the first semester involves meeting with the client and evaluating alternatives, while the second semester involves the bulk of the design and product evaluation. As a result, statistical analysis of component failure and design reliability is not needed until the second semester. This change will also provide additional flexibility in course schedule to students who are not following the suggested course sequence exactly, such as transfer students.

ECE 481 EE Senior Design II (3 cr)
Gen Ed: Senior Experience
The capstone design sequence for electrical engineering majors. Course topics include design, research, simulation, and experimental methods; specifications, prototyping, troubleshooting and verification; report writing, documentation and oral presentations. Topics are considered in the context of a major design project involving a team of students. Projects incorporate realistic engineering constraints; i.e. environmental, sustainability, manufacturability, ethical, safety, social and political considerations.
Prereq: ECE 480 and STAT 301 or Permission

Available via distance: Yes
Geographical Area: Moscow, Engineering Outreach
Rationale: STAT-301 used to be a pre-req for ECE-480, which was changed to a co-req of ECE-480. The proposed change is to assure STAT-301 is taken before ECE-481.

ECE 482 Computer Engineering Senior Design I (3 cr)
The capstone design sequence for computer engineering majors. Application of formal software and hardware design techniques, hardware/software interface considerations, project management; specifications, prototyping, troubleshooting and verification; report writing, documentation and oral presentations. Topics are considered in the context of a major design project involving a team of students. Projects incorporate realistic engineering constraints; i.e. environmental, sustainability, manufacturability, ethical, safety, social and political considerations.
Prereq: CS 240, 270, ECE 240, 241, 310, 311, 340, 341, 350, and 351, ~~and Stat 301,~~ or Permission

Coreq: ECE 440 and STAT 301

Available via distance: Yes
Geographical Area: Moscow, Engineering Outreach
Rationale: The Computer Engineering Senior Design sequence has evolved such that the first semester involves meeting with the client and evaluating alternatives, while the second semester involves the bulk of the design and product evaluation. As a result, statistical analysis of component failure and design reliability is not needed until the second semester. This change will also provide additional flexibility in course schedule to students who are not following the suggested course sequence exactly, such as transfer students.

ECE 483 Computer Engineering Senior Design II (3 cr)
Gen Ed: Senior Experience
The capstone design sequence for computer engineering majors. Application of formal software and hardware design techniques, hardware/software interface considerations, project management; specifications, prototyping, troubleshooting and verification; report writing, documentation and oral presentations. Topics are considered in the context of a major design project involving a team of students. Projects incorporate realistic engineering constraints; i.e. environmental, sustainability, manufacturability, ethical, safety, social and political considerations.
Prereq: ECE 440 and 482 and STAT 301; or Permission

Available via distance: Yes
Geographical Area: Moscow, Engineering Outreach
Rationale: STAT-301 used to be a pre-req for ECE 482 which was changed to co-req. Therefore, STAT-301 is added as a pre-req for ECE-483 to assure students take this course.

3. Make the following curricular changes to the **Major in Computer Engineering** (B.S.Comp.E.):

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

CHEM 111	Principles of Chemistry I	4 cr
COMM 101	Fundamntls Public Speaking	2 cr
CS 120	Computer Science I	4 cr
CS 121	Computer Science II	3 cr
CS 150	Computer Organization and Architecture	3 cr
CS 210	Programming Languages	3 cr
CS 240	Computer Operating Systems	3 cr
CS 270	System Software	3 cr
ECE 101	Foundations of Electrical and Computer Engineering	2 cr
ECE 210	Electrical Circuits I	3 cr
ECE 211	Electrical Circuits Lab I	1 cr
ECE 212	Electrical Circuits II	3 cr
ECE 213	Electrical Circuits II Lab	1 cr
ECE 240	Digital Logic	3 cr
ECE 241	Logic Circuit Lab	1 cr
ECE 292	Sophomore Seminar	0 cr
ECE 310	Microelectronics I	3 cr

ECE 311	Microelectronics I Lab	1 cr
ECE 340	Microcontrollers	3 cr
ECE 341	Microcontrollers Lab	1 cr
ECE 350	Signals and Systems I	3 cr
ECE 351	Signals and Systems I Lab	1 cr
ECE 440	Digital Systems Engineering	3 cr
ECE 482	Computer Engineering Senior Design I	3 cr
ECE 483	Computer Engineering Senior Design II	3 cr
ECE 491	Senior Seminar	0 cr
ENGL 317	Technical Writing	3 cr
MATH 170	Analytic Geometry and Calculus I	4 cr
MATH 175	Analytic Geometry and Calculus II	4 cr
MATH 176	Discrete Mathematics	3 cr
MATH 310	Ordinary Differential Equations	3 cr
MATH 330	Linear Algebra	3 cr
PHYS 211	Engineering Physics I	3 cr
PHYS 211L	Laboratory Physics I	1 cr
PHYS 212	Engineering Physics II	3 cr
PHYS 212L	Laboratory Physics II	1 cr
STAT 301	Probability and Statistics	3 cr

**Transfer or high-school students admitted to the University with prior credit for STAT 251 are permitted to substitute this credit for the degree requirement of STAT 301.*

Technical Electives (15 cr):

	Technical Electives	15 cr

Selected from upper-division computer engineering, electrical engineering, and computer science courses.

One of the following (3 cr):

AMST 301	Studies in American Culture	3 cr
PHIL 103	Ethics	3 cr

One of the following (3-4 cr):

ECON 201	Principles of Macroeconomics	3 cr
ECON 202	Principles of Microeconomics	3 cr
ECON 272	Foundations of Economic Analysis	4 cr

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

Students majoring in computer engineering must earn a grade of P in ECE 292 and a grade of C or better in each of the following courses for graduation, and before registration is permitted in upper-division engineering courses: CHEM 111, CS 120, ECE 210, ECE 211, ECE 212, ECE 213, ECE 240 and ECE 241; MATH 170, MATH 175, and MATH 310; and PHYS 211, PHYS 211L, PHYS 212, and PHYS 212L. ~~Students majoring in computer engineering must earn a grade of C or better in each of the following courses for graduation, and before registration is permitted in upper-division engineering courses: ECE 210, ECE 212, ECE 240, ECE 241, MATH 170, MATH 175, MATH 310, PHYS 211, and PHYS 212.~~ Students majoring in computer engineering must earn a grade of C or better in each of the following courses for graduation, and before registration is permitted in 200-level CS courses: ~~Before registration is permitted in 200-level CS courses students majoring in computer engineering~~

~~must earn a grade of C or better in~~ CS 120, CS 121 and CS 150 and MATH 176. Students majoring in computer engineering must earn a grade of C or better in each of the following courses for graduation, and before registration is permitted in upper-division CS courses: CS 210, CS 240, CS 270, and MATH 170, MATH 175, and MATH 176 ~~for graduation and before registration is permitted in upper-division CS courses.~~

Students majoring in computer engineering must meet the college requirements for admission to classes (see "Admission to Classes" under College of Engineering, part four).

Any student majoring in computer engineering may accumulate no more than five (5) letter grades of D's and F's in mathematics, science, or engineering courses that are used to satisfy graduation requirements. Included in this number are multiple repeats of a single class or single repeats in multiple classes and courses transferred from other institutions. Specifically excluded are D or F grades from laboratory sections associated with courses.

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

Geographical Area: Moscow

Rationale: The Computer Engineering degree program shares courses between both BSCS and BSEE programs. This wording change accomplishes two objectives: (1) it eliminates a "loophole" whereby students could register for a 200-level CS but then receive a D in CS 121 or Math 176 since a C or better was not explicitly stated as a requirement for graduation; and (2) standardizes the wording of the requirements and the list of courses across the degrees to prevent students from switching degrees to bypass requirements.

With an increased emphasis on dual-enrollment or advanced placement courses we are seeing a larger number of students entering UI with prior credit for STAT 251. While STAT 301 is preferable and thus still required for students without prior credit for STAT 251, there is sufficient overlap that there is no material benefit to asking students to take STAT 301 after having already completed the equivalent of STAT 251. This change in the degree requirements will facilitate the transition of high school and transfer students into the BSCompE degree program.

4. Make the following curricular changes to the **Major in Electrical Engineering** (B.S.E.E.):

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

CHEM 111	Principles of Chemistry I	4 cr
CS 120	Computer Science I	4 cr
ECE 101	Foundations of Electrical and Computer Engineering	2 cr
ECE 210	Electrical Circuits I	3 cr
ECE 211	Electrical Circuits Lab I	1 cr
ECE 212	Electrical Circuits II	3 cr
ECE 213	Electrical Circuits II Lab	1 cr
ECE 240	Digital Logic	3 cr
ECE 241	Logic Circuit Lab	1 cr
ECE 292	Sophomore Seminar	0 cr
ECE 310	Microelectronics I	3 cr
ECE 311	Microelectronics I Lab	1 cr
ECE 320	Energy Systems I	3 cr
ECE 321	Energy Systems I Laboratory	1 cr

ECE 330	Electromagnetic Theory	3 cr
ECE 331	Electromagnetics Laboratory	1 cr
ECE 340	Microcontrollers	3 cr
ECE 341	Microcontrollers Lab	1 cr
ECE 350	Signals and Systems I	3 cr
ECE 351	Signals and Systems I Lab	1 cr
ECE 480	EE Senior Design I	3 cr
ECE 481	EE Senior Design II	3 cr
ECE 491	Senior Seminar	0 cr
ENGR 210	Engineering Statics	3 cr
ENGR 220	Engineering Dynamics	3 cr
ENGR 360	Engineering Economy	2 cr
ENGL 317	Technical Writing	3 cr
MATH 170	Analytic Geometry and Calculus I	4 cr
MATH 175	Analytic Geometry and Calculus II	4 cr
MATH 275	Analytic Geometry and Calculus III	3 cr
MATH 310	Ordinary Differential Equations	3 cr
MATH 330	Linear Algebra	3 cr
PHYS 211	Engineering Physics I	3 cr
PHYS 211L	Laboratory Physics I	1 cr
PHYS 212	Engineering Physics II	3 cr
PHYS 212L	Laboratory Physics II	1 cr
STAT 301	Probability and Statistics	3 cr

**Transfer or high-school students admitted to the University with prior credit for STAT 251 are permitted to substitute this credit for the degree requirement of STAT 301.*

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Available via distance: 50% or more of curricular requirements cannot be completed via distance
Geographical Area: Moscow
Rationale: With an increased emphasis on dual-enrollment or advanced placement courses we are seeing a larger number of students entering UI with prior credit for STAT 251. While STAT 301 is preferable and thus still required for students without prior credit for STAT 251, there is sufficient overlap that there is no material benefit to asking students to take STAT 301 after having already completed the equivalent of STAT 251. This change in the degree requirements will facilitate the transition of high school and transfer students into the BSEE degree program.

ENGINEERING MANAGEMENT

1. Add the following course:

EM 550 Process Improvement Methods (3 cr)
This course will examine a framework for delivering dramatic and sustained continuous improvement results through the integration of improvement methodologies such as Lean Six Sigma and Design for Lean Six Sigma (DFLSS).

Available via distance: Yes
Geographical Area: Online
Rationale: This course has been offered as a special topics course (EM 504) and is important for the EM curriculum so we want to give it a permanent course number (EM 550). The course description has been simplified to allow for more course flexibility.

2. Change the following course:

EM 560 Project Risk Management (3 cr)
Application of project risk assessment tools and techniques that help increase the probability of project success. Discover different approaches used by commercial and federal agencies to identify, assess, and quantify risks and their impacts on projects.
Prereq: ~~EM 510 or TM 510; or~~ Instructor Permission

Available via distance: Yes
Geographical Area: Online
Rationale: It is requested to change the prerequisites for EM 560, and to remove EM 510 and TM 510 (Engineering and Technology Management Fundamentals) as prerequisite courses. The content of EM 560 is not dependent on EM 510 and TM 510, and the EM curriculum does not require that the students have taken EM 510 or TM 510 in order to enroll in EM 560.

3. Drop the following courses:

EM 482 Project Engineering (3 cr)
See CE 482.

Available via distance: Yes
Geographical Area: Online
Rationale: EM is exclusively a graduate program and only delivers a Masters of Engineering degree. Our curriculum requires 500-level courses. As such, we are eliminating all EM 400-level courses.

EM 486 Software-Assisted Project Management (3 cr)
Characteristics and features of project management; procedures and techniques used in identifying software features that are necessary for recording project plans and for reporting project progress; process of selecting project management software that is consistent with the organization's procedures and requirements; evaluation of the modeling capabilities of a system in estimating and scheduling specific case studies of engineering projects. Two lec and 3 hrs of lab a wk.
Prereq: CE 482 or PMP Certification

Available via distance: Yes
Geographical Area: Online
Rationale: EM is exclusively a graduate program and only delivers a Masters of Engineering degree. Our curriculum requires 500-level courses. As such, we are eliminating all EM 400-level courses.

EM 515 (s) Advanced Topics in Engineering Management (2-9 cr, max 9)
Same as TM 515. Advanced topics in Engineering Management and Technology Management.
Prereq: Instructor Permission

Available via distance: Yes
Geographical Area: Online
Rationale: Should a student require a directed study type of course, as approved, such course would be delivered as EM502 - Directed Study, which is the conventional means to deliver such courses. As such, EM515 is redundant and not necessary for the program.

INDUSTRIAL TECHNOLOGY

1. Add the following course:

INDT 474 Mechatronics Systems (3 cr)
Mechatronics is a multi-disciplinary engineering discipline representing a synergistic combination of mechanical, electrical, control, and computer engineering, integrated through a design process. The course provides a cross-disciplinary study of mechatronics systems at a theoretical and practical level. The emphasis is on a balanced approach to: (1) theoretical and analytical understanding of the fundamentals of mechatronics system design, and (2) practical implementation of learned concepts. Software and hardware simulation and interfacing is studied and reinforced through a set of assignments, lab exercises, and a project, based on the Lego Mindstorms EV3 kit.
Prereq: INDT 333 or permission

Available via distance: No
Geographical Area: Idaho Falls
Rationale: It is requested to add a new course INDT 474 Mechatronics Systems. The course was offered in Fall 2015 and Fall 2016 semesters as INDT 404: Special Topics – Mechatronics Systems. There is an interest for the course, therefore we would like to offer it regularly within our curriculum.

2. Change the following courses:

INDT 411 ~~Facility Fire Hazard Management~~ Fire and Life Safety Management (3 cr)
Conduct complex inspection surveys of commercial and residential properties to evaluate physical characteristics of a property and business. Oversee acquisition, installation, operation, maintenance and disposition of building systems. Understand public protection class and municipal and private water systems. Possess knowledge of property fire insurance, building construction and/or field experience in performing fire/property surveys involving detailed analysis. Observe, examine, inspect, gather data and describe all aspects of a property/building and business. Possess knowledge of fire services, environmental hazards, and building construction.
~~**Prereq:** Permission~~

Available via distance: Yes
Geographical Area: Idaho Falls

Rationale: It is requested to change the title of the course INDT 411 to Fire and Life Safety Management. The modified title is more descriptive of the topics covered in the course.

INDT 412 ~~Structural Designs for Fire and Life Safety~~ Engineering for Fire and Life Safety (3 cr)
Identify fire protection in special occupancies. Identify fire protection in warehouse and storage operations. Identify fire protection of electronic equipment. Understand and apply related NFPA standards and company requirements and standards. Evaluate code, law, and regulation compliance of a facility's operations. Identify safety control systems (PLC controllers, hardwired interlock systems) as it applies to: NFPA 70E, 79, 85 and 86 ANSI/ISA 84.00.01-2003 (IEC 61511) Safety Integrity Levels 1, 2 or 3. Identify principles of human behavior and fire. Identify the chemistry and physics of fire. Identify dynamics of fire growth. Identify challenges to safety in the built environment. Apply fundamentals of safe building design. Identify the local and regional codes and standards for the built environment.
~~**Prereq:** Permission~~

Available via distance: Yes
Geographical Area: Idaho Falls
Rationale: It is requested to change the title of the course INDT 412 to Engineering for Fire and Life Safety. The modified title is more descriptive of the topics covered in the course.

MECHANICAL ENGINEERING

1. Add the following course:

ME 416 FE Exam Review (1 cr)
Review of 10 essential topics on the Mechanical Engineering Fundamentals of Engineering exam, including preparation in each topic area based on online review sessions and solving sample problems. Graded P/F
Prereq: Senior Standing

Available via distance: Yes
Geographical Area: Moscow, Online/Web-based
Rationale: Several years ago the Fundamentals of Engineering exam format changed from a classroom based once per year/semester event to an online based exam taken in a testing center. The current course that students take, CE 411, has not evolved with the new format of the online exam. The ME faculty have voted to create a new FE Exam Review course specifically for ME students to prepare them for the exam. All review sessions would be pre-recorded and students would watch them via BbLearn or similar tool, and work sample problems to prepare for the exam. The class would be graded as P/F and students can complete the required topics at anytime during the semester in which they are registered for the class. CE 411 would be dropped from the ME curriculum and the workload is negligible because the review sessions would be pre-recorded and used for several semesters before needing to be updated.

2. Make the following curricular changes to the **Minor in Mechanical Engineering**:

~~ENGR 105~~	~~Engineering Graphics~~	~~2 cr~~
ENGR 210	Engineering Statics	3 cr
ENGR 220	Engineering Dynamics	3 cr
ME 123	Introduction to Mechanical Design	3 cr
	*or equivalent introductory engineering/science course	
ME 223	Mechanical Design Analysis	3 cr

Four course~~Courses~~ selected from the following (~~9~~12 cr):
~~(Including at least 6 cr from ME courses)~~

ENGR 320	Engineering Thermodynamics and Heat Transfer	3 cr
	OR	
ME 322	Mechanical Engineering Thermodynamics	3 cr
ENGR 335	Engineering Fluid Mechanics	3 cr
ENGR 350	Engineering Mechanics of Materials	3 cr
ME 301	Computer Aided Engineering	3 cr
ME 313	Dynamic Modeling of Engineering Systems	3 cr
ME 330	Experimental Methods for Engineers	3 cr
ME 410	Principles of Lean Manufacturing	3 cr
~~ME 325~~	~~Machine Component Design I~~	~~3 cr~~
~~ME 345~~	~~Heat Transfer~~	~~3 cr~~
MSE 201	Elements of Materials Science	3 cr
	Other technical electives as approved by the department chair	

Courses to total 23 credits for this minor

Available via distance: 50% or more of curricular requirements cannot be completed via distance
Geographical Area: Moscow
Rationale: Updating the courses required for an ME Minor, no additional workload results from the changes. This should make the ME minor more accessible to other majors.

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

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

~~CE 411~~	~~Engineering Fundamentals~~	~~1 cr~~
CHEM 111	Principles of Chemistry I	4 cr
COMM 101	Fundamntls Public Speaking	2 cr
ENGL 317	Technical Writing	3 cr
ENGR 210	Engineering Statics	3 cr
ENGR 220	Engineering Dynamics	3 cr
ENGR 240	Introduction to Electrical Circuits	3 cr
ENGR 335	Engineering Fluid Mechanics	3 cr
ENGR 350	Engineering Mechanics of Materials	3 cr
MSE 201	Elements of Materials Science	3 cr

MATH 170	Analytic Geometry and Calculus I	4 cr
MATH 175	Analytic Geometry and Calculus II	4 cr
MATH 275	Analytic Geometry and Calculus III	3 cr
MATH 310	Ordinary Differential Equations	3 cr
MATH 330	Linear Algebra	3 cr
ME 123	Introduction to Mechanical Design	3 cr
ME 223	Mechanical Design Analysis	3 cr
ME 301	Computer Aided Design Methods	3 cr
ME 313	Dynamic Modeling of Engineering Systems	3 cr
ME 322	Mechanical Engineering Thermodynamics	3 cr
ME 325	Machine Component Design I	3 cr
ME 330	Experimental Methods for Engineers	3 cr
ME 341	Intermediate Mechanics of Materials	3 cr
ME 345	Heat Transfer	3 cr
ME 416	FE Exam Review	1 cr
ME 424	Mechanical Systems Design I	3 cr
ME 426	Mechanical Systems Design II	3 cr
ME 430	Senior Lab	3 cr
ME 435	Thermal Energy Systems Design	3 cr
PHIL 103	Ethics	3 cr
PHYS 211	Engineering Physics I	3 cr
PHYS 211L	Laboratory Physics I	1 cr
PHYS 212	Engineering Physics II	3 cr
PHYS 212L	Laboratory Physics II	1 cr

One from the following (3-4 cr):

ECON 201	Principles of Macroeconomics	3 cr
ECON 202	Principles of Microeconomics	3 cr
ECON 272	Foundations of Economic Analysis	4 cr

Technical Elective requirements for Mechanical Engineering (15 cr):

Fifteen credits of technical electives are required from the list below. 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 in below:

ENTR 414	Entrepreneurship	3 cr
OM 378	Project Management	3 cr
OM 439	Systems & Simulations	3 cr
OM 456	Quality Management	3 cr
ENGR 360	Engineering Economy	2 cr
MATH 371	Mathematical Physics	3 cr
MATH 420	Complex Variables	3 cr
MATH 428	Numerical Methods	3 cr
MATH 432	Numerical Linear Algebra	3 cr
MATH 437	Mathematical Biology	3 cr
MATH 451	Probability Theory	3 cr
MATH 452	Mathematical Statistics	3 cr
MATH 453	Stochastic Models	3 cr

MATH 471	Introduction to Analysis I	3 cr
MATH 472	Introduction to Analysis II	3 cr
MATH 480	Partial Differential Equations	3 cr
ME 401	Engineering Team Projects	2-3 cr
ME 404	Special Topics	1-16 cr
ME 410	Principles of Lean Manufacturing	3 cr
ME 412	Gas Dynamics	3 cr
ME 413	Engineering Acoustics	3 cr
	OR	
ME 513	Engineering Acoustics	3 cr
ME 414	HVAC Systems	3 cr
	OR	
ME 514	HVAC Systems	3 cr
ME 417	Turbomachinery	3 cr
	OR	
ME 517	Turbomachinery	3 cr
ME 420	Fluid Dynamics	3 cr
	OR	
ME 520	Fluid Dynamics	3 cr
ME 421	Advanced Computer Aided Design	3 cr
ME 422	Applied Thermodynamics	3 cr
ME 423	Human Factors and Ergonomics in Product Design	3 cr
ME 425	Machine Component Design II	3 cr
ME 433	Combustion Engine Systems	3 cr
ME 436	Sustainable Energy Sources & Systems	3 cr
ME 438	Sustainability & Green Design	3 cr
	OR	
ME 538	Sustainability & Green Design	3 cr
ME 444	Air Conditioning Engineering	3 cr
ME 450	Computational Fluid Dynamics	3 cr
	OR	
ME 550	Computational Fluid Dynamics	3 cr
ME 451	Experimental Methods in Fluid Dynamics	3 cr
	OR	
ME 551	Experimental Methods in Fluid Dynamics	3 cr
ME 452	TechVentures: High Technology Entrepreneurship	3 cr
	OR	
ME 552	TechVentures: High Technology Entrepreneurship	3 cr
ME 458	Finite Element Applications in Engineering	3 cr

	OR	
ME 558	Finite Element Applications in Engineering	3 cr
ME 461	Fatigue and Fracture Mechanics	3 cr
ME 464	Robotics: Kinematics, Dynamics, and Control	3 cr
	OR	
ME 564	Robotics: Kinematics, Dynamics, and Control	3 cr
ME 472	Mechanical Vibrations	3 cr
ME 481	Control Systems	3 cr
ME 490	Solid Modeling, Simulation and Manufacturing Capstone	3 cr
ME 519	Fluid Transients	3 cr
ME 521	Design Synthesis with Solid Modeling	3 cr
ME 525	Advanced Heat Transfer	3 cr
ME 529	Combustion and Air Pollution	3 cr
ME 539	Advanced Mechanics of Materials	3 cr
ME 540	Continuum Mechanics	3 cr
ME 541	Mechanical Engineering Analysis	3 cr
ME 544	Conduction Heat Transfer	3 cr
ME 546	Convective Heat Transfer	3 cr
ME 547	Thermal Radiation Processes	3 cr
ME 548	Elasticity	3 cr
ME 549	Finite Element Analysis	3 cr
ME 571	Building Performance Simulation for Integrated Design	3 cr
ME 578/CS 578/ECE 578	Neural Network Design	3 cr
ME 580	Linear System Theory	3 cr
ME 583/CE 541	Reliability of Engineering Systems	3 cr
PHYS 351	Introductory Quantum Mechanics I	3 cr
PHYS 305	Modern Physics	3 cr
PHYS 411	Advanced Physics Lab	4 cr
PHYS 425	Relativity	3 cr
	OR	
PHYS 525	Relativity	3 cr
PHYS 428	Numerical Methods	3 cr
	OR	
PHYS 528	Numerical Methods	3 cr
PHYS 443	Optics	3 cr
	OR	
PHYS 543	Optics	3 cr
PHYS 444	Quantum Optics	3 cr
	OR	

PHYS 544	Quantum Optics	3 cr
PHYS 464	Materials Physics and Engineering	3 cr
PHYS 465	Nuclear and Particle Physics	3 cr
	OR	
PHYS 565	Particle and Nuclear Physics	3 cr
PHYS 484	Astrophysics	3 cr
	OR	
PHYS 584	Astrophysics	3 cr
STAT 301	Probability and Statistics	3 cr
STAT 431	Statistical Analysis	3 cr
STAT 446/OM 446	Six Sigma Innovation	3 cr
	Any Approved 400/500 Level Course in another Engineering Discipline	

A maximum of 6 credits of the following may be used:

ME 307	Group Mentoring I	1 cr
ME 308	Group Mentoring II	1 cr
ME 401	Engineering Team Projects	2-3 cr
ME 407	Group Mentoring III	1 cr

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

Available via distance: 50% or more of curricular requirements cannot be completed via distance
Geographical Area: Moscow
Rationale: Updating the list of Technical Electives possible to use for a BSME degree, no added workload for this update.

Eliminating CE 411 and adding ME 4XX FE Exam Review. Several years ago the Fundamentals of Engineering exam format changed from a classroom based once per year/semester event to an online based exam taken in a testing center. The current course that students take, CE 411, has not evolved with the new format of the online exam. The ME faculty have voted to create a new FE Exam Review course specifically for ME students to prepare them for the exam. All review sessions would be pre-recorded and students would watch them via BbLearn or similar tool, and work sample problems to prepare for the exam. The class would be graded as P/F and students can complete the required topics at anytime during the semester in which they are registered for the class. The workload is negligible because the review sessions would be pre-recorded and used for several semesters before needing to be updated.

NUCLEAR ENGINEERING

1. Add the following course:

NE 520 Thermodynamics of Nuclear Power Plants (3 cr)
Course covers applications of First Law to power nuclear plants: boiling water, pressurized, high temperature gas, small modular and advanced nuclear power plants. Nuclear power plant applications of pressurizers, suppression pools, nuclear containment, the application of the Second Law to exergy analysis of advanced fuel cycles.
Prereq: Permission

Available via distance: Yes
Geographical Area: Idaho Falls
Rationale: Course has been offered as a 504 Special Topics. Course will support the focus area electives within the program. No additional workload is expected.

TECHNOLOGY MANAGEMENT

1. Add the following course:

TM 517 Critical Infrastructure Security and Resilience Fundamentals (3 cr)
This course provides an introduction to the policy, strategy, and practical application of critical infrastructure security and resilience from an all-hazards perspective. It describes the strategic context presented by the 21st century, and discusses the challenges and opportunities associated with public-private partnerships in infrastructure protection, risk analysis and mitigation, and incident response.

Available via distance: Yes
Geographical Area: Moscow, CDA, Idaho Falls
Rationale: It is requested to add a new course TM 517 Critical Infrastructure Security and Resilience Fundamentals. The course was offered in Fall 2017 semesters as TM 504: Special Topics course. The course is going to be offered on a regular basis, and is a requirement of the Graduate Certificate of Critical Infrastructure Resilience.

2. Make the following curricular change to the **Critical Infrastructure Resilience Graduate Certificate**:

~~TM 504~~	~~Special Topics~~	~~1-16 cr~~
TM 517	Critical Infrastructure Security and Resilience Fundamentals	3 cr

Electives Group 1 (6 cr):

CS 536	Advanced Information Assurance Concepts	3 cr
ECE 469	Resilient Control of Critical Infrastructure	3 cr
INDT 470	Homeland Security	3 cr
INDT 472	National Incident Management Systems	3 cr
TM 529	Risk Assessment	3 cr
TM 516	Nuclear Rules and Regulations	3 cr

Electives Group 2 (3 cr):

CHE 445	Digital Process Control	3 cr
CS 452	Real-Time Operating Systems	3 cr

ECE 340	Microcontrollers	3 cr
ECE 443	Distributed Processing and Control Networks	3 cr
ECE 444	Supervisory Control and Critical Infrastructure Systems	3 cr
ECE 470	Control Systems	3 cr
ECE 477	Digital Process Control	3 cr
INDT 333	Industrial Electronics and Control Systems	3 cr
ME 481	Control Systems	3 cr
TM 514	Nuclear Safety	3 cr

Electives Groups 3 (3 cr):

CS 438	Network Security	3 cr
CS 439	Applied Security Concepts	3 cr
CS 447	Computer and Network Forensics	3 cr

Courses to total 15 credits for this certificate

Available via distance: 100% of curricular requirements can be completed via distance
Geographical Area: Moscow, CDA, Idaho Falls
Rationale: There are two proposed changes. The first is the required course for this Graduate Certificate, currently listed as a Special Topics course TM 504, should be modified to reflect the new permanent course number, which is being requested in this same change cycle. We have suggested course number TM 517.
The second change is for a course in the first group of electives, listed as ECE 404/504, but which now has a permanent course number of ECE 469/569. [Editor's Note: This change already appears in the 17-18 Catalog]