COLLEGE OF ENGINEERING

COURSE AND CURRICULUM CHANGES

Approved at the College faculty meeting

February 27, 2009

Fiedler Auditorium

3:30 p.m.

Undergraduate/Graduate
Expedited and Non-Expedited items

Contact Person: Jim Goddard
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Units outside the college, which may be directly impacted by these changes are:

None

Please provide the sponsors of a proposed change with any information regarding fiscal **or programmatic impact on your department, program or students.**

EXPEDITED COURSE PROPOSALS
Graduate (Courses number 600-999)

Department of Mechanical and Nuclear Engineering

FROM: **NE 612. Principles of Radiation Detection (3) ~~I~~** Operating principles and general properties of devices used in the detection and characterization of ionizing radiation. Fundamental methods of data interpretation and presentation. Two hours rec. and three hours lab. a week. Pr: NE 495

TO: **NE 612. Principles of Radiation Detection (3) II** Operating principles and general properties of devices used in the detection and characterization of ionizing radiation. Fundamental methods of data interpretation and presentation. Two hours rec. and three hours lab. a week. Pr: NE 495

RATIONALE: Change of semester offered to improve curriculum.

EFFECTIVE DATE: Spring 2010

FROM: **NE 690. Radiation Protection and Shielding (3) ~~II~~** Basic concepts of radiation protection, doses, associated risks, and exposure limits. Properties of natural and other radiation sources, and evaluation of internal and external doses. Techniques for shield design including ray, point kernel, and transport theories for both neutrons and gamma rays. Three hours rec. a week. Pr: NE 495

TO: **NE 690. Radiation Protection and Shielding (3) I** Basic concepts of radiation protection, doses, associated risks, and exposure limits. Properties of natural and other radiation sources, and evaluation of internal and external doses. Techniques for shield design including ray, point kernel, and transport theories for both neutrons and gamma rays. Three hours rec. a week. Pr: NE 495

RATIONALE: Change of semester offered to improve curriculum.

EFFECTIVE DATE: Fall 2010

FROM: **CHE 626. Bioseparations (~~2~~) II, in even years** Study of separations important in food and biochemical engineering such as leaching, extraction, expression, absorption, ion exchange, filtration, centrifugation, membrane separation, and chromatographic separations. ~~Two~~ hours rec. a week. Pr: CHE 531 or BAE ~~575~~.

TO: **CHE 626. Bioseparations (3) II, in even years** Study of separations important in food and biochemical engineering such as leaching, extraction, expression, absorption, ion exchange, filtration, centrifugation, membrane separation, and chromatographic separations. Three hours rec. a week. Pr: CHE 531 or BAE 545.

RATIONALE: The importance of this subject and the number of relevant topics within the field have increased to the point that adequate coverage cannot be provided within a 2 credit hour course. Thus, it is very desirable to change the number of credit hours for this course from 2 to 3. In addition, the number of undergraduate students taking this course has increased significantly. Expanding the course from a 2 to 3 credit hours will be beneficial to the students as they plan their academic program.

EFFECTIVE DATE: Fall 2009

NON-EXPEDITED COURSE PROPOSALS
Undergraduate (Courses numbered 000-599)

Department of Computing and Information Sciences

ADD: **CIS 551. Introduction to Computer and Information Security (3) I** An introduction to computer and information security, including common attack techniques, application of cryptography in security, authentication and authorization, network security, enterprise network defense, web security, and analysis of design flaws that render a system vulnerable. Course projects provide hands-on experience on both the defense and offense aspects in cyber space. Not available for credit to students with credit in CIS 751. Three hours rec. a week. Pr. CIS 450 or 520.

RATIONALE: Computer security has become a major problem facing our nation's information infrastructures. To develop the workforce that meets the needs of future careers in computing, comprehensive education in computer and information security is needed at the undergraduate level for computer science students.

IMPACT: This course would serve as an elective for computing and information sciences majors, and would not impact any other department.

EFFECTIVE DATE: Fall 2009

General Engineering - Dean's Office

ADD: **DEN 050. Conditional Admittance Support for Transfer Students (0) I, II** Transfer students who have been conditionally admitted to the College of Engineering must enroll in this course. This course will provide frequent communication and support in the areas of study skills and time management. By appointment.

RATIONALE: This course will allow us to track and communicate, through K-State Onine, with the students who are conditionally admitted to the College of Engineering, with the intent of offering additional support and thus retaining a greater percentage of them. This course will also provide the data we need, through iSIS, to track the performance of conditionally admitted students more efficiently.

IMPACT: This course will not impact other academic programs.

EFFECTIVE DATE: Fall 2009

ADD: **DEN 060. Reinstatement Support (0) I, II** Students who have been reinstated into the College of Engineering must enroll in this course. This course will provide frequent communication and support in the areas of study skills and time management. By appointment.

RATIONALE: This course will allow us to track and communicate, through K-State Onine, with the students who are reinstated into the College of Engineering, with the intent of offering additional support and thus retaining a greater percentage of them. This course will also provide the data we need, through iSIS, to track the performance of conditionally reinstated students more efficiently.

IMPACT: This course will not impact other academic programs.

EFFECTIVE DATE: Fall 2009

Department of Electrical and Computer Engineering

ADD: **ECE 582. Wind Energy Research (1) II** This course provides an opportunity to pursue one or more longer-term research questions related to wind engineering, including small-wind siting and installation and meteorological-tower installation and data analysis. One hour rec. a week. Pr.: Instructor permission.

RATIONALE: This course will be offered in semesters opposite 681 (Wind and Solar Engineering). Students enrolled will oversee the Wind for Schools turbine installations and pursue independent research. ~~A separate course listing makes it easier to find a single meeting time~~.

IMPACT: None outside of the Dept.

EFFECTIVE DATE: Spring 2010

NON-EXPEDITED COURSE PROPOSALS
Graduate (numbered 600-999)

Department of Electrical and Computer Engineering

ADD: **ECE 760. Wireless Communications (3) II** This course exposes seniors and first year graduate students to important physical layer concepts in wireless communications. Topics include: cellular architecture, large scale and small scale fading channel models, diversity receivers, DS-CDMA transmitter and receiver design, multi-user detection, multi-carrier CDMA and OFDM performance analysis. Three hours lec. a week. Pr. ECE 660

RATIONALE: The plan is to offer this course on a regular basis to both senior undergraduate and first year graduate students.

IMPACT: This course is also offered as a distance education course

EFFECTIVE DATE: Spring 2010

ADD: **ECE 724. Analog Electronics (3) II** Analysis, design, and evaluation of BJT and CMOS operational amplifiers. Core topics include frequency compensation and closed-loop stability, slew-rate optimization, wide-bandwidth design, low-noise design, and macromodeling for simulation. Three hours lec. a week. Pr. ECE 502, ECE 526

RATIONALE: This course introduces both graduate and advanced undergraduate students to the design of analog electronic circuits of moderate complexity. The amplification of small signals is the most fundamental of analog applications and is essential to modern mixed-signal systems. Operational amplifier circuitry incorporates many of the most important electronic sub-circuits and techniques and generally stands as an example of how best to make an amplifier.

IMPACT: None outside of the Dept.

EFFECTIVE DATE: Spring 2010

ADD: **ECE 722. Audio Engineering (3) II** Solid-state and hollow-state analog electronics applicable to high-fidelity audio. Emphasis is on the analysis, design and construction of audio amplifiers. Projects include design, implementation, and performance-evaluation of a reference-quality audio

power amplifier. Two hours lec. and three hours lab a week. Pr.: ECE 525. Recommended: ECE 526.

RATIONALE: The intent is to offer this course to senior undergraduate students and first-year graduate students on a regular basis.

IMPACT: None outside of the Dept.

EFFECTIVE DATE: Spring 2010

ADD: **ECE 715. Electroacoustics (3) I** Basic principles of sound; modeling of, and analogous circuits for, mechanical and acoustical systems; microphones and loudspeakers; Thiele-Small parameters; the analysis and design of, and measurements on, common loudspeaker systems and crossover networks. Projects involve the design, simulation, construction and performance-testing of a complete loudspeaker-and-enclosure system. Two hours lec. and three hours lab a week. Pr.: ECE 511.

RATIONALE: The intent is to offer this course to senior undergraduate students and first-year graduate students on a regular basis.

IMPACT: None outside of the Dept.

EFFECTIVE DATE: Fall 2009

Expedited Undergraduate Curriculum Changes

Department of Chemical Engineering Curriculum Changes:

Bachelor degree requirements Freshman year Fall semester (15 credit hours) • Humanities/social science elective Credits: (3) • CHE 015 - Engineering Assembly Credits: (0) • CHE 110 - Current Topics in Chemical Engineering Credits: (1) • CHM 210 - Chemistry I Credits: (4) • ~~**~~ENGL 100 - Expository Writing I Credits: (3) • MATH 220 - Analytic Geometry and Calculus I Credits: (4) Spring semester (16 credit hours) • Humanities/social science elective Credits: (3) • CHE 015 - Engineering Assembly Credits: (0) • CHM 230 - Chemistry II Credits: (4) • ~~**~~COMM 105 - Public Speaking IA Credits: (2) • ECON 110 - Principles of Macroeconomics Credits: (3) • MATH 221 - Analytic Geometry and Calculus II Credits: (4) Sophomore year Fall semester (16 credit hours) • CHE 015 - Engineering Assembly Credits: (0) • CHE 320 - Chemical Process Analysis Credits: (3) • CHM 371 - Chemical Analysis Credits: (4) • ~~‡~~MATH 222 - Analytic Geometry and Calculus III Credits: (4) • PHYS 213 - Engineering Physics I Credits: (5) Spring semester (17 credit hours) • CHE 015 - Engineering Assembly Credits:	**Bachelor degree requirements** Freshman year Fall semester (15 credit hours) • Humanities/social science elective Credits: (3) • CHE 015 - Engineering Assembly Credits: (0) • CHE 110 - Current Topics in Chemical Engineering Credits: (1) • CHM 210 - Chemistry I Credits: (4)** • ENGL 100 - Expository Writing I Credits: (3) • MATH 220 - Analytic Geometry and Calculus I Credits: (4) Spring semester (16 credit hours) • Humanities/social science elective Credits: (3) • CHE 015 - Engineering Assembly Credits: (0) • CHM 230 - Chemistry II Credits: (4)** • COMM 105 - Public Speaking IA Credits: (2) • ECON 110 - Principles of Macroeconomics Credits: (3) • MATH 221 - Analytic Geometry and Calculus II Credits: (4) Sophomore year Fall semester (16 credit hours) • CHE 015 - Engineering Assembly Credits: (0) • ~~*~~CHE 320 - Chemical Process Analysis Credits: (3) • CHM 371 - Chemical Analysis Credits: (4)† • MATH 222 - Analytic Geometry and Calculus III Credits: (4) • PHYS 213 - Engineering Physics I Credits: (5) Spring semester (17 credit hours) • CHE 015 - Engineering Assembly Credits:

(0)
- CHE 350 - Electronic Materials Credits: (2)

or

- CHE 352 - Structural Materials Credits: (2)
- CHE 416 - Computional Techniques in Chemical Engineering Credits: (3)
- CHM 531 - Organic Chemistry I Credits: (3)
- MATH 240 - Elementary Differential Equations Credits: (4)
- PHYS 214 - Engineering Physics II Credits: (5)

Junior year

Fall semester (16 credit hours)

- Chemistry/biochemistry elective‡ Credits: (3)
- Advanced laboratory experience§ Credits: (2)
- Humanities/social science elective Credits: (3)
- CHE 015 - Engineering Assembly Credits: (0)
- CHE 520 - Chemical Engineering Thermodynamics I Credits: (2)
- CHE 530 - Transport Phenomena I Credits: (3)
- ENGL 415 - Written Communication for Engineers Credits: (3)

Spring semester (15 credit hours)

- Technical elective Credits: (3)
- CHE 015 - Engineering Assembly Credits: (0)
- CHE 521 - Chemical Engineering Thermodynamics II Credits: (3)
- CHE 531 - Transport Phenomena II Credits: (3)
- CHE 535 - Transport Phenomena Laboratory Credits: (3)
- CHM 595 - Physical Chemistry II Credits: (3)

Senior year

Fall semester (17 credit hours)

- Technical elective Credits: (3)
- UGE ≥ 300 level humanities and social science elective Credits: (6)
- CHE 015 - Engineering Assembly Credits: (0)
- CHE 550 - Chemical Reaction Engineering

(0)
- CHE 350 - Electronic Materials Credits: (2)

or

- CHE 352 - Structural Materials Credits: (2)
- *CHE 416 - Computional Techniques in Chemical Engineering Credits: (3)
- CHM 531 - Organic Chemistry I Credits: (3)
- MATH 240 - Elementary Differential Equations Credits: (4)
- PHYS 214 - Engineering Physics II Credits: (5)

Junior year

Fall semester (16 credit hours)

- Chemistry/biochemistry elective‡ Credits: (3)
- Advanced laboratory experience§ Credits: (2)
- Humanities/social science elective Credits: (3)
- CHE 015 - Engineering Assembly Credits: (0)
- *CHE 520 - Chemical Engineering Thermodynamics I Credits: (2)
- *CHE 530 - Transport Phenomena I Credits: (3)
- ENGL 415 - Written Communication for Engineers Credits: (3)

Spring semester (15 credit hours)

- Technical elective Credits: (3)
- CHE 015 - Engineering Assembly Credits: (0)
- *CHE 521 - Chemical Engineering Thermodynamics II Credits: (3)
- *CHE 531 - Transport Phenomena II Credits: (3)
- *CHE 535 - Transport Phenomena Laboratory Credits: (3)
- CHM 595 - Physical Chemistry II Credits: (3)

Senior year

Fall semester (17 credit hours)

- Technical elective Credits: (3)
- UGE ≥ 300 level humanities and social science elective Credits: (6)
- CHE 015 - Engineering Assembly Credits: (0)
- *CHE 550 - Chemical Reaction Engineering Credits: (3)

Credits: (3)
- CHE 560 - Separational Process Design Credits: (3)
- CHE 570 - Chemical Engineering Systems Design I Credits: (2)

Spring semester (16 credit hours)

- Chemical engineering elective Credits: (3)
- Unrestricted elective Credits: (3)
- CHE 015 - Engineering Assembly Credits: (0)
- CHE 542 - Unit Operations Laboratory Credits: (3)
- CHE 561 - Chemical Process Dynamics and Control Credits: (3)
- CHE 571 - Chemical Engineering Systems Design II Credits: (4)

Notes

**Chemical Principles I (CHM 220) and Chemical Principles II (CHM 250) may be taken instead of CHM 210, CHM 230, and CHM 371. If this option is elected, two additional credit hours of technical electives are to be selected.

‡Chemistry/biochemistry/biology electives: Chemistry: Possible selections include Organic Chemistry II (CHM 550), Instrumental Analysis (CHM 566), and Physical Chemistry I (CHM 585). Biochemistry: Possible selections include General Biochemistry (BIOCH 521), Physical Studies of Biomacromolecules (BIOCH 590), Biochemistry I (BIOCH 755), and Biochemistry II (BIOCH 765); Biology: BIOL 450 or above; some possible courses include Modern Genetics (BIOL 450), General Microbiology (BIOL 455), Plant Physiology (BIOL 500), Fundamentals of Ecology (BIOL 529) or Cell Biology (BIOL 541).

§The advanced laboratory experience is to be a 2-credit-hour laboratory course selected from the following courses: Organic Chemistry Laboratory (CHM 532), Physical Methods Laboratory (CHM 596), General Biochemistry Laboratory (BIOCH 522), or Biochemistry I Laboratory (BIOCH 756).

The departmental requirements below must be satisfied.

- 32 credit hours of electives are required, and they are to be selected in consultation with the student's advisor. All electives must be on the lists approved by the department or

- *CHE 560 - Separational Process Design Credits: (3)
- *CHE 570 - Chemical Engineering Systems Design I Credits: (2)

Spring semester (16 credit hours)

- Chemical engineering elective Credits: (3)
- Unrestricted elective Credits: (3)
- CHE 015 - Engineering Assembly Credits: (0)
- *CHE 542 - Unit Operations Laboratory Credits: (3)
- CHE 561 - Chemical Process Dynamics and Control Credits: (3)
- *CHE 571 - Chemical Engineering Systems Design II Credits: (4)

Notes

* These courses form the chemical engineering core program.

**Chemical Principles I (CHM 220) and Chemical Principles II (CHM 250) may be taken instead of CHM 210, CHM 230, and CHM 371. If this option is elected, two additional credit hours of technical electives are to be selected.

‡Chemistry/biochemistry/biology electives: Chemistry: Possible selections include Organic Chemistry II (CHM 550), Instrumental Analysis (CHM 566), and Physical Chemistry I (CHM 585). Biochemistry: Possible selections include General Biochemistry (BIOCH 521), Physical Studies of Biomacromolecules (BIOCH 590), Biochemistry I (BIOCH 755), and Biochemistry II (BIOCH 765); Biology: BIOL 450 or above; some possible courses include Modern Genetics (BIOL 450), General Microbiology (BIOL 455), Plant Physiology (BIOL 500), Fundamentals of Ecology (BIOL 529) or Cell Biology (BIOL 541).

§The advanced laboratory experience is to be a 2-credit-hour laboratory course selected from the following courses: Organic Chemistry Laboratory (CHM 532), Physical Methods Laboratory (CHM 596), General Biochemistry Laboratory (BIOCH 522), or Biochemistry I Laboratory (BIOCH 756).

The departmental requirements below must be satisfied.

- 32 credit hours of electives are required, and they are to be selected in consultation with the student's advisor. All electives

have the approval of the department head and must support the educational objectives of the chemical engineering program. Both the required and elective components of a student's overall program of study must meet UGE criteria. 17 credit hours of technical electives are required. These electives must include one chemistry/biochemistry/biology (3 credit hours) course, an advanced laboratory experience (2 credit hours), and a chemical engineering elective (3 credit hours). The remaining 6 credit hours of technical electives are to be chosen from courses identified as engineering topics, with at least one course selected from either analytical mechanics (both statics and dynamics must be represented) or circuits, fields, and electronics. • 15 credit hours of social sciences and humanities electives are required. These courses are to be selected from the list approved by the College of Engineering. At least 6 hours of 300-level or higher UGE courses must be included within these 15 hours. All courses must be taken for a letter grade. • Three (3) credit hours of unrestricted elective are to be selected from courses numbered 100 or higher, excluding courses listed as a prerequisite to a required course. Total hours required for graduation (128)	must be on the lists approved by the department or have the approval of the department head and must support the educational objectives of the chemical engineering program. Both the required and elective components of a student's overall program of study must meet UGE criteria. 17 credit hours of technical electives are required. These electives must include one chemistry/biochemistry/biology (3 credit hours) course, an advanced laboratory experience (2 credit hours), and a chemical engineering elective (3 credit hours). The remaining 6 credit hours of technical electives are to be chosen from courses identified as engineering topics, with at least one course selected from either analytical mechanics (both statics and dynamics must be represented) or circuits, fields, and electronics. • 15 credit hours of social sciences and humanities electives are required. These courses are to be selected from the list approved by the College of Engineering. At least 6 hours of 300-level or higher UGE courses must be included within these 15 hours. All courses must be taken for a letter grade. • Three (3) credit hours of unrestricted elective are to be selected from courses numbered 100 or higher, excluding courses listed as a prerequisite to a required course. <u>A grade of C or higher in each course within the chemical engineering core program is required for graduation.</u> Total hours required for graduation (128)

Rationale: The changes below define a chemical engineering core program for which the students are required to obtain a grade of C or better for graduation. Our desire is to ensure that our graduates have a sufficient proficiency in key aspects of chemical engineering prior to graduation. This approach is being pursued instead of a requirement of C or better in course prerequisites in order to minimize the impact on the students' progress through the program due to the fact that these courses are only taught once per academic year.

Footnotes with respect to ENGL 100, COMM 105, and MATH 222 have been dropped from the previous version of the curriculum (the "FROM:" section) because they were inappropriately labeled in the existing catalog. These are merely editorial corrections to existing electronic version of the catalog.

Effective Date: Fall 2009

Department of Mechanical and Nuclear Engineering

Mechanical Engineering (ME) (B.S.) **CURRENT DESCRIPTION**	**Mechanical Engineering (ME) (B.S.)** **PROPOSED DESCRIPTION**
Bachelor of science in mechanical engineering Accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050 Baltimore, MD 21202-4012. 410-347-7700. **Bachelor degree requirements** **Freshman year** **Fall semester (16 credit hours)** • Humanities or social science elective Credits: (3)** • CHM 210 - Chemistry I **Credits:** (4) • ENGL 100 - Expository Writing I **Credits:** (3)* • MATH 220 - Analytic Geometry and Calculus I **Credits:** (4) • ME 101 - Introduction to Mechanical Engineering **Credits:** (2) **Spring semester (16 credit hours)** • COMM 105 - Public Speaking IA **Credits:** (2) • ECON 110 - Principles of Macroeconomics **Credits:** (3) • MATH 221 - Analytic Geometry and Calculus II **Credits:** (4) • ME 212 - Engineering Graphics **Credits:** (2) • PHYS 213 - Engineering Physics I **Credits:** (5) **Sophomore year** **Fall semester (16 credit hours)** • CE 333 - Statics **Credits:** (3)	Bachelor of science in mechanical engineering Accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050 Baltimore, MD 21202-4012. 410-347-7700. **Bachelor degree requirements** **Freshman year** **Fall semester (16 credit hours)** • Humanities or social science elective Credits: (3)** • CHM 210 - Chemistry I **Credits:** (4) • ENGL 100 - Expository Writing I **Credits:** (3)* • MATH 220 - Analytic Geometry and Calculus I **Credits:** (4) • ME 101 - Introduction to Mechanical Engineering **Credits:** (2) **Spring semester (16 credit hours)** • COMM 105 - Public Speaking IA **Credits:** (2) • ECON 110 - Principles of Macroeconomics **Credits:** (3) • MATH 221 - Analytic Geometry and Calculus II **Credits:** (4) • ME 212 - Engineering Graphics **Credits:** (2) • PHYS 213 - Engineering Physics I **Credits:** (5) **Sophomore year** **Fall semester (16 credit hours)** • CE 333 - Statics **Credits:** (3)

• CHE 352 - Structural Materials **Credits:** (2) • IMSE 250 - Introduction to Manufacturing Processes and Systems **Credits:** (2) • MATH 222 - Analytic Geometry and Calculus III **Credits:** (4) • PHYS 214 - Engineering Physics II **Credits:** (5) **Spring semester (16 credit hours)** • Humanities or social science elective Credits: (3)** • MATH 240 - Elementary Differential Equations **Credits:** (4) • ME 512 - Dynamics **Credits:** (3) • ME 513 - Thermodynamics I **Credits:** (3) • NE 495 - Elements of Nuclear Engineering **Credits:** (3) **Junior year**	• CHE 352 - Structural Materials **Credits:** (2) • IMSE 250 - Introduction to Manufacturing Processes and Systems **Credits:** (2) • MATH 222 - Analytic Geometry and Calculus III **Credits:** (4) • PHYS 214 - Engineering Physics II **Credits:** (5) **Spring semester (16 credit hours)** • Humanities or social science elective Credits: (3)** • MATH 240 - Elementary Differential Equations **Credits:** (4) • ME 512 - Dynamics **Credits:** (3) • ME 513 - Thermodynamics I **Credits:** (3) • NE 495 - Elements of Nuclear Engineering **Credits:** (3) **Junior year**
Fall semester (16 credit hours) • CE 533 - Mechanics of Materials **Credits:** (3) • EECE 519 - Electric Circuits and Control **Credits:** (4) • MATH 551 - Applied Matrix Theory **Credits:** (3) • ME 400 - Computer Applications in Mechanical Engineering **Credits:** (3) **Choose from the following:** • Technical electives Credits: (3)*** or • ~~NE 612 - Principles of Radiation Detection **Credits:** (3)~~ **Spring semester (16 credit hours)** • ME 533 - Machine Design I **Credits:** (3) • ~~ME 535 - Measurement and Instrumentation Laboratory **Credits:**~~	**Fall semester (16 credit hours)** • CE 533 - Mechanics of Materials **Credits:** (3) • EECE 519 - Electric Circuits and Control **Credits:** (4) • MATH 551 - Applied Matrix Theory **Credits:** (3) • ME 400 - Computer Applications in Mechanical Engineering **Credits:** (3) **Choose from the following:** • Technical electives Credits: (3)*** or • <u>NE 690 - Radiation Protection and Shielding **Credits:** (3) *****</u> **Spring semester (16 credit hours)** • ME 533 - Machine Design I **Credits:** (3) • ME 570 - Control of <u>Mechanical</u> Systems I **Credits:** (4)

~~(3)~~ • ME 570 - Control of ~~MEchanical~~ Systems I **Credits:** (4) • ME 571 - Fluid Mechanics **Credits:** (3) **Choose from the following:** • Technical electives Credits: (3)*** ~~or~~ • ~~NE 690 - Radiation Protection and Shielding **Credits:** (3) ****~~ **Senior year** **Fall semester (16 credit hours)** • Technical electives Credits: (3)*** • Humanities or social science elective Credits: (2)*** • ENGL 415 - Written Communication for Engineers **Credits:** (3) * • IMSE 530 - Engineering Economic Analysis **Credits:** (2) • ME 574 - Interdisciplinary Industrial Design Projects I **Credits:** (3) **Choose from the following:** • Technical electives Credits: (3)*** or • NE 630 - Nuclear Reactor Theory **Credits:** (3) **** **Spring semester (15 credit hours)** • Technical electives Credits: (3)*** • Humanities or social science elective Credits: (3)** • ME 573 - Heat Transfer **Credits:** (3) • ME 575 - Interdisciplinary Industrial Design Projects II **Credits:** (3) **Choose from the following:** • Technical electives Credits: (3)***	• ME 571 - Fluid Mechanics **Credits:** (3) **Choose from the following:** • Technical electives Credits: (3)*** • ME 535 - Measurement and Instrumentation Laboratory **Credits:** (3) **** or • NE 612 - Principles of Radiation Detection **Credits:** (3) ***** **Senior year** **Fall semester (16 credit hours)** • Technical electives Credits: (3)*** • Humanities or social science elective Credits: (2)*** • ENGL 415 - Written Communication for Engineers **Credits:** (3) * • IMSE 530 - Engineering Economic Analysis **Credits:** (2) • ME 574 - Interdisciplinary Industrial Design Projects I **Credits:** (3) **Choose from the following:** • Technical electives Credits: (3)*** or • NE 630 - Nuclear Reactor Theory **Credits:** (3) ***** **Spring semester (15 credit hours)** • Technical electives Credits: (3)*** • Humanities or social science elective Credits: (3)** • ME 573 - Heat Transfer **Credits:** (3) • ME 575 - Interdisciplinary Industrial Design Projects II **Credits:** (3) **Choose from the following:**

or • NE 648 - Nuclear Reactor Laboratory **Credits:** (3) **** **Notes** *Students must complete the appropriate prerequisite credits for ENGL 415, but may apply only 3 of ENGL 415 prerequisite credit hours towards degree requirements. **Humanities and social science electives are to be selected from the approved lists and the College of Engineering UGE requirements must also be met. The College of Engineering general education worksheet should be used to insure that the UGE requirements are met. ***Three technical electives are to be chosen from MNE courses with at least one course 600-level or above. Another technical elective course is to be chosen from 200-level or above College of Engineering (including MNE) classes. The remaining technical elective credits are to be chosen from 200-level or above College of Engineering, math, chemistry, physics, biology, or business administration classes or 400-level or above statistics classes. Other classes that strengthen a student's program of study will be considered and require advisor and department head approval. ****Nuclear engineering option. The four nuclear engineering option courses fulfill the requirement of the three MNE and one College of Engineering technical elective courses. **Total hours required for graduation (127)**	• Technical electives Credits: (3)*** or • NE 648 - Nuclear Reactor Laboratory **Credits:** (3) ***** **Notes** *Students must complete the appropriate prerequisite credits for ENGL 415, but may apply only 3 of ENGL 415 prerequisite credit hours towards degree requirements. **Humanities and social science electives are to be selected from the approved lists and the College of Engineering UGE requirements must also be met. The College of Engineering general education worksheet should be used to insure that the UGE requirements are met. ***Three technical electives are to be chosen from MNE courses with at least one course 600-level or above. Another technical elective course is to be chosen from 200-level or above College of Engineering (including MNE) classes. The remaining technical elective credits are to be chosen from 200-level or above College of Engineering, math, chemistry, physics, biology, or business administration classes or 400-level or above statistics classes. Other classes that strengthen a student's program of study will be considered and require advisor and department head approval. ****ME 535 and NE 612 may both be taken and one of them applied as a Tech Elective. NE 612 must be taken for the NE Option. *****Nuclear engineering option. The four nuclear engineering option courses fulfill the requirement of the three MNE and one College of Engineering technical elective courses. **Total hours required for graduation (127)**

Rationale: Curriculum change to allow either ME 535 or NE 612 to satisfy measurement and instrumentation component of degree.

Semester offering change of NE 612 and NE 690 so that NE 612 and ME 535 are offered same semester to better accommodate student schedules.

Effective Date: Spring 2010