The University of Michigan
College of Engineering
Curriculum Committee

Agenda
March 8, 2011
1:30-3:00 p.m.
Room 265 Chrysler Center

1. Approval of Minutes From 02-22-2011
2. Course Approval Forms
3. Decision on Joint Meeting with LS&A
4. CEE Curriculum Changes and CA Forms
5. UM-SJTU Program Proposal for NA&ME
6. Suggested Changes to the Course Approval Request Form
7. Suggested Updates to the Policy for Concentrations
8. Suggested Updates to the Policy for Minors
9. Update from James Holloway (Time Permitting)

University of Michigan
College of Engineering
Curriculum Committee Meeting
Tuesday February 22, 2011
1:30-3:00 p.m.
GM Room 4th Floor Lurie Engineering Center
Minutes

Marina Epelman called the meeting to order at 1:40 p.m.

Members Present: M. Epelman, J. Barker, L. Bernal, E. Durfee, J. Holloway, R. Hryciw, D. Kieras, E. Larsen, L. Meadows, S. Montgomery T. Perakis, R. Robertson, F.Terry

Members Absent: E. Gulari, A. Hunt, J. Li, J. Pan, F. Ward, S.Vozar

Guests: Amy Goldstein, Aileen Huang-Saad

The minutes of the last meeting, February 8, 2011 were approved

Course Approval Forms

These Courses Were Approved:

CEE 200	New Course
CEE 325	Modification—Changed Prerequisite from: CEE 211 and prior or concurrent enrollment in CEE 230 or ME 235 (Enforced) ***to: CEE 211(Enforced)***
CEE 521	Modification—Changed Prerequisite from: CEE 421 ***to: CEE 325 or equivalent***
CEE 621	Modification-- Changed Prerequisite from: CEE 521 ***to: CEE 325 or equivalent***
CEE 881	New Course
ENGR 411	New Course (approved with a slight change in the description)

These Courses Weren't Approved:

CEE 260	Modification— Changing Title From: Environmental and Sustainable Engineering Principles ***to: Sustainable Engineering Principles***; Changing Description; Changing Credit Hours and Contact Hours from: 4 ***to:3***
CEE 319	New Course
CEE 581	Modification—Adding X-Listing with GEOSCI 425; Changing Description; Changing Prerequisite from: Chem 125 ***to: Chem 125 or equivalent;*** Changing Level of Credit from: Ugrad or Rackham grad ***to: All Credit Types***

Proposal: Entrepreneurship Practicum (ENGR 411)

Information regarding this was included in the meeting packet. Aileen Hunag-Saad introduced this Proposal. Course Description: This practicum focuses on entrepreneurial and hence product oriented

work. The practicum is designed to provide students first-hand experience in entrepreneurship by advancing an invention towards an entrepreneurial goal, or by getting involved in an entrepreneurial environment. Course Objectives: The most important learning objective of this course is that the student understand the entrepreneurial process. The student will not be graded on whether or not they actually launch a venture, or how far along the venture gets.
After taking the course, the student should have practical techniques that will allow them to assess the market opportunity for devices, products or services as well as the feasibility of starting a business venture around it.
There was some discussion regarding this.
This was moved and seconded and approved.

Suggested Changes to Course Approval Request From

This was tabled due to time constraints.

Suggested Updates to Concentrations

This was tabled due to time constraints.

Suggested Updates to Minors

This was tabled due to time constraints.

Adjournment: Motion to adjourn was made and seconded
Motion carried (approved)

Next Meeting: March 8, 2011 1:30 PM Room 265 Chrysler Center

COURSE APPROVAL FORMS

For March 08, 2011 CoE CC Meeting

CHE 344 Modification—Changing Description

THE UNIVERSITY OF MICHIGAN -- COLLEGE OF ENGINEERING
Course Approval Request
College Curriculum Committee, 1420 Lurie Engineering Center Building

Form Number: 2198
Date: 2/7/2011
Effective Term: Spring 2011
Course Offer Freq: ☒ Indefinitely ☐ One term only

Action Requested
○ New Course
◉ Modification of Existing Course
○ Deletion of Course

Complete the following sections:
New Courses - B & C completely
Modifications - A modified information, B & C completely
Deletions - A & C completely

A. CURRENT LISTING	B. REQUESTED LISTING
Home Department: CHE Chemical Engineering	Home Department: CHE Chemical Engineering
Course Number: 344	Course Number: 344
☐ Cross Listed Course Information:	Cross Listed Course Information:
☐ Course Title:	Course Title: Reaction Engineering and Design
TITLE ABBREVIATION — Time Sched Max = 19 Spaces: Reaction Engr Des	TITLE ABBREVIATION — Time Sched Max = 19 Spaces: Reaction Engr Des
TITLE ABBREVIATION — Transcript Max = 20 Spaces: REACT ENGR	TITLE ABBREVIATION — Transcript Max = 20 Spaces: REACT ENGR
☒ Course Description: Fundamentals of chemical reaction engineering. Rate laws, kinetics, and mechanisms of homogeneous and heterogeneous reactions. Analysis of rate data, multiple reactions, heat effects, bioreactors. Design of industrial reactors.	Course Description for Official Publication (Max = 50 words): Fundamentals of chemical reaction engineering. Rate laws, kinetics, and mechanisms of homogeneous and heterogeneous reactions. Analysis of rate data, multiple reactions, heat effects, bioreactors, Safety (Runaway Reactions). Design of industrial reactors.
PROGRAM OUTCOMES: ☒a ☒c ☒e ☒g ☒i ☒k ☒b ☒d ☐f ☐h ☐j	PROGRAM OUTCOMES: ☒a ☒c ☒e ☒g ☒i ☒k ☒b ☒d ☐f ☐h ☐j
Degree Requirements: ◉ Degree Requirement ○ Free Elective ○ Other ○ Core Course ○ Tech Elective	Degree Requirements: ◉ Degree Requirement ○ Free Elective ○ Other ○ Core Course ○ Tech Elective
Prereq "ChE 330,342" ◉ Enforced ○ Advised	Prereq "ChE 330,342" ◉ Enforced ○ Advised
Credit Restrictions:	Credit Restrictions:
Level of Credit: ☒ Undergrad only ☐ Ugrad or Rckhm Grad ☐ R ☐ Rackham Grad ☐ Ugrad or Non-Rckhm Grad ☐ Non-Rckhm Grad ☐ All Credit types	Level of Credit: ☒ Undergrad only ☐ Ugrad or Rckhm Grad ☐ I ☐ Rackham Grad ☐ Ugrad or Non-Rckhm Grad ☐ Non-Rckhm Grad ☐ All Credit types
Credit Hours Min 4 Max 4; Contact Hrs/Wk 4; Number of Wks 14	Credit Hours Min 4 Max 4; Contact Hrs/Wk 4; Number of Wks 14

Repeatability (Indi Research, Dir. Study, Dissertation: Is this course repeatable? ○ Yes ◉ No Max Hours? ____ Max Times? ____ Can it be repeated in the same term? ○ Yes ○ No

C.

Class Type(s)
☒ Lec ☐ Sem ☐ Dis ☐ Other ____
☐ Rec ☐ Lab ☐ Ind

Graded Section
☒ Lec ☐ Sem ☐ Dis ☐ Other ____
☐ Rec ☐ Lab ☐ Ind

Grading
☒ A-E
☐ CR/NC
☐ P/F
☐ S/U
Course Is Y Graded ☐

Location
☒ Ann Arbor
☐ Biological Station
☐ Camp Davis
☐ Extension

Cognizant Faculty Member: H. Scott Fogler — Title: Professor

Grad Course: Attach nomination if Cognizant Faculty is not a regular graduate faculty

Approval Info | **Approved by Name** | **Approved Date**

☐ Curriculum Comm.
☐ Faculty
☐ Cross listed Unit 1
☐ Cross listed Unit 2

Submitted By: ☒ Home Dept. ☐ Cross-listed Dept.

Department Chair Name: Mark Burns, ChE Chair — **Chair Signature**

Home Dept.
Cross-listed Dept(s).

Form Number

2198

SUPPORTING STATEMENT

Addition of safety to course description to satisfy possible future ABET requirements.

Are any special resources or facilities required for this course? ☐ Yes ☒ No

Detail the Special requirements

Subjects req'd by all programs Math/Sci/HUSS/Engin 100, 101	**55**	
Basic Science Elective	3	New ABET Requirement (see attached list of choices)
CEE Required Courses:		
CEE 200	1	New course: *Introduction to Civil and Environmental Engineering*
CEE 211	4	No change
CEE 212	4	No change
CEE 230 or CEE 319	**3**	New elective in *Sensors, Electrical Circuits and Signal Processing* (CEE 319) added as alternative to *Energy and Environment* (CEE 230)
CEE 260	3	Revised as 3 credit *Sustainable Engineering Principles*
CEE 270	4	No change
CEE 303	4	No change
CEE 325	4	Eliminated CEE 230 prerequisite
CEE 345	4	No change, contains major technical communication content
CEE 402	4	No change
Program Subject Electives (select 4 of 5):		
CEE 312	4	
CEE 351	4	
CEE 360	4	
CEE 421	4	Select 4 of 5
CEE 431	4	
Technical Electives (unchanged)	**9**	**No change**
Unrestricted Electives	10	
TOTAL	**128**	

Courses Used to Meet ABET's 3rd Science Requirement for B.S. in Civil Engineering

Biology 171 (4 cr)	Introductory Biology – Ecology and Evolution
Biology 172 (4 cr)	Introductory Biology – Molecular, Cellular, and Developmental
Biology 174 (4 cr)	Introductory Molecular Biology for Engineers
Geosci 119 (4 cr)	Intro. Geology
Geosci 201 (3-4 cr)	Introduction to Physical Geography
Geosci 222 (3 cr)	Introductory Oceanography
Geosci 284 (4 cr)	Environmental Geology
Geosci 320 (4 cr)	Earth System Evolution
CEE 582 (3 cr)	Environmental Microbiology

THE UNIVERSITY OF MICHIGAN -- COLLEGE OF ENGINEERING
Course Approval Request
College Curriculum Committee, 1420 Lurie Engineering Center Building

Form Number: 2199
Date: 2/8/2011
Effective Term: Fall 2011
Course Offer Freq: ☒ Indefinitely ☐ One term only

Action Requested
○ New Course
◉ Modification of Existing Course
○ Deletion of Course

Complete the following sections:
New Courses - B & C completely
Modifications - A modified information, B & C completely
Deletions - A & C completely

A. CURRENT LISTING	B. REQUESTED LISTING
Home Department: CEE Civil & Environmental Engin	Home Department: CEE Civil & Environmental Engin
Course Number: 260	Course Number: 260
☐ Cross Listed Course Information:	Cross Listed Course Information:
☒ Course Title: Environmental and Sustainable Engineering Principles	Course Title: Sustainable Engineering Principles
TITLE ABBREVIATION — Time Sched Max = 19 Spaces: Env & Sustain Engrg	TITLE ABBREVIATION — Time Sched Max = 19 Spaces: SUSENG
TITLE ABBREVIATION — Transcript Max = 20 Spaces: Env & Sustain Engrg	TITLE ABBREVIATION — Transcript Max = 20 Spaces: SUSENG
☒ Course Description: Mass balance modeling of contaminant fate and transport in the environment; pollutant types, sources, controls and treatment processes; pollution prevention, life-cycle assessment and economic decision-making concepts for minimizing global, regional and local environmental impact in engineering design; government legislation and regulation, exposure pathways and health risks of priority pollutants.	Course Description for Official Publication (Max = 50 words): Sustainable engineering principles including calculations of environmental emissions and resource consumption. Mass and energy balance calculations in context of pollution generation and prevention, resource recovery, and life-cycle assessment. Economic aspects of sustainable engineering decision-making. Social impacts of technology system design decisions including ethical frameworks, government legislation, and health risks.
PROGRAM OUTCOMES: ☒ a ☒ c ☒ e ☐ g ☐ i ☒ k ☐ b ☐ d ☒ f ☒ h ☒ j	PROGRAM OUTCOMES: ☒ a ☒ c ☒ e ☐ g ☐ i ☒ k ☐ b ☐ d ☒ f ☒ h ☒ j
Degree Requirements: ◉ Degree Requirement ○ Free Elective ○ Other ○ Core Course ○ Tech Elective	Degree Requirements: ◉ Degree Requirement ○ Free Elective ○ Other ○ Core Course ○ Tech Elective
Prereq: Chem 130, Math 116 ○ Enforced ◉ Advised	Prereq: Chem 130, Math 116 ○ Enforced ◉ Advised
☐ Credit Restrictions:	Credit Restrictions:
☒ Level of Credit: ☒ Undergrad only ☐ Rackham Grad ☐ Non-Rckhm Grad ☐ Ugrad or Rckhm Grad; ☐ Ugrad or Non-Rckhm Grad ☐ All Credit types ☐ Rckhm Grad w/add'l Work	Level of Credit: ☒ Undergrad only ☐ Rackham Grad ☐ Non-Rckhm Grad ☐ Ugrad or Rckhm Grad; ☐ Ugrad or Non-Rckhm Grad ☐ All Credit types ☐ Rckhm Grad w/add'l Work
Credit Hours Min 4 Max 4; Contact Hrs/Wk 4; Number of Wks 14	Credit Hours Min 3 Max 3; Contact Hrs/Wk 3; Number of Wks 14

C.

Repeatability (Indi Research, Dir. Study, Dissertation): Is this course repeatable? ○ Yes ◉ No Max Hours? 3 Max Times? 1 Can it be repeated in the same term? ○ Yes ◉ No

☐ Class Type(s): ☒ Lec ☐ Sem ☐ Dis ☐ Other ☐ Rec ☐ Lab ☐ Ind
Graded Section: ☒ Lec ☐ Sem ☐ Dis ☐ Other ☐ Rec ☐ Lab ☐ Ind
Grading: ☒ A-E ☐ CR/NC ☐ P/F ☐ S/U — Course Is Y Graded ☐
Location: ☒ Ann Arbor ☐ Biological Station ☐ Camp Davis ☐ Extension

Cognizant Faculty Member: Kim F. Hayes — Title: Professor

Grad Course: Attach nomination if Cognizant Faculty is not a regular graduate faculty

Approval Info	Approved by Name	Approved Date
☐ Curriculum Comm.		
☐ Faculty		
☐ Cross listed Unit 1		
☐ Cross listed Unit 2		

Submitted By: ☒ Home Dept. ☐ Cross-listed Dept.

Department Chair Name: Nancy G. Love, Chair and Professor — Chair Signature

Home Dept.

Cross-listed Dept(s).

Course Development. Over the summer 2011, with support from the CoE, new course materials on *Sustainability Engineering Principles* will be collected and developed for CEE 260, including lecture notes, web-based learning tools, problem sets, in-class case studies, and course readings. Three faculty members will be initially involved in this process, one from CEE (Kim Hayes), one from ChE (Phil Savage) and one from ME (Steve Skerlos). The course (see attached proposed CEE 260 Syllabus, Attachment C) will start with an introduction on the concepts of sustainable development (e.g., the Triple Bottom Line: societal, environmental, and economic drivers in engineering decisions). Following the introduction, Kim Hayes (CEE) will be responsible for preparing lecture material and course notes for the first 3rd of the course on *Materials and Environmental Impact* (pollutants, mass balances and emissions, input/output life cycle analysis, environmental impact metrics including ecosystem and human health assessment, ozone depletion and global warming potential). Phil Savage (ChE) will develop and present the second 3rd of the course on concepts of *Energy and the Environment* (Energy Balances and Production, Stationary and Mobile Sources, and Alternative Fuels). For the final portion of the course, Steve Skerlos (ME) will take the lead in which sustainable engineering principles will be applied to engineering *Decision Making and Design* (taking into account stakeholders and ethical frameworks, life cycle costs in environment assessment, and the use of computer software (e.g., SimaPro) to inform design decisions in terms of material selection, process/product development, and technology systems such as buildings, urban infrastructure, and water distribution systems). All 3 instructors will help to develop the examples for the last 3rd of the course.

Form Number

2199

SUPPORTING STATEMENT

Designing for the environment has become a popular concept and an essential one for today's engineers, who must not only consider product reliability and performance in design, but who must also incorporate environmental costs and life cycle thinking into product development. While these concepts are beginning to trickle down into the CoE undergraduate curriculum within the context of specialized 500-level courses that serve as a base for specialized graduate programs (e.g., ConsEnSus and SNRE Industrial Ecology Certificates Program) and into some undergraduate courses through the interests of individual instructors, sustainable engineering principles have not been integrated in a comprehensive and systematic way within any single department or series of courses in the CoE. A starting point for developing a program to systematically introduce sustainable engineering principles into the undergraduate curriculum is to have an innovative and exciting introductory course on this topic that is suitable for all engineers. Recognizing this need, in 2004, CEE 260, a basic course in Environmental Principles was revised to incorporate sustainable engineering principles using Funds from a Whitaker grant, and is currently taught as an introduction to Environmental and Sustainable Engineering Principles. However, over the last 6 years the field of sustainable engineering principles has matured considerably with quantitative sustainability assessment tools now more readily available for educating undergraduate engineering students. Likewise, student interest and knowledge about this topic has risen considerably as well as the desire in the CoE to develop programs of study for undergraduates that incorporate sustainable engineering principles. For these reasons, the CEE Department is proposing to further revise CEE 260 into a course devoted to introducing Sustainable Engineering Principles for its own undergraduates and as part of a 3-course 9-credit sustainability program for all COE undergraduates. Furthermore, the CEE Department is proposing a new undergraduate curriculum in which the revised CEE 260 will be required of all its undergraduates.

Are any special resources or facilities required for this course? ☒ Yes ☐ No

Detail the Special requirements

To facilitate the development of this course, to recognize the importance of including multiple perspectives across different engineering disciplines, and to have the course first offering ready by F11, the College of Engineering has agreed to provide W11 summary salary support (2 weeks) for the three co-instructors (Kim F. Hayes-CEE, Phil Savage-ChE, and Steve Skerlos-ME), and summer GSI support (3 months or 1 month per instructor) to collect and prepare the course materials as noted above under course development.

CEE 260 Sustainable Engineering Principles Syllabus (3 credit hours)

Course Title: Sustainable Engineering Principles
Course Instructors: Professors Kim F. Hayes, Phil Savage, and Steve Skerlos
Class Hours: T,Th (TBD)
Prerequisites: Chem 130, Math 116
Course Description: Designing for minimal impact on the environment and optimizing life cycle costs are critical activities for many engineering disciplines. To understand how to make engineering decisions that protect or improve both the environment and society while also ensuring return on investment, engineers need to use the basic concepts of sustainable engineering principles. To practice sustainable engineering, an engineer must learn the fundamentals of environmental pollution prevention, life cycle assessment, and economic decision-making, while also learning to use these concepts toward the design of products and processes that minimize environmental impact. This in turn requires consideration of material selection, mass and energy balances of inputs and outputs, and quantification of pollutant emissions during the life cycle of products, processes or services. Relative to this, engineers should be should have an understanding of basic computational tools and metrics that can be used to assess relative environmental impacts of engineering decisions on both human and ecosystem health at local, regional, and global scales. The overall objective of this course is to teach students the basic principles of sustainable engineering. After this course, the student should:

1. be able to perform basic mass and energy balances to calculate resource consumption and emissions associated with engineering decisions.
2. be able to explain and apply quantifiable metrics of environmental impact from pollutant emissions at local, regional, and global scales.
3. be able to quantify energy efficiencies and emissions for mobile and stationary energy conversion systems.
4. be able to understand and apply life cycle assessment and related footprint analyses for a material, product, process, or engineered system within an engineering decision-making context.
5. be able to perform net present value and life cycle cost estimates among different design options using basic engineering economic principles.
6. be able to identify the trade-offs among social, economic, and environmental drivers in engineering decision making.

Examples of Sources for Selected Readings:

1. *Materials for the Environment: Eco-Informed Material Choice*, Michael F. Ashbey, Butterworth-Heinemann, Oxford UK, 2009.
2. *Introduction to Environmental Engineering and Science,* Gilbert M. Master and Wendell P. Ela, 3rd Edition, Pearson Prentice Hall, 2008.
3. *Introduction to Engineering and Environment*, E.S. Rubin, McGraw Hill, 2001.
4. *Energy for Sustainability: Technology, Planning, and Policy*, J. Randolf and G. Masters, Island Press, Washington D.C., 2008.
5. *Industrial Ecology and Sustainable Engineering,* T.E. Graedel and B.R. Allenby, Prentice Hall, New York, 2010
6. *Introduction to LCA with SimaPro 7,* Pre Consultants: Mark Goedkoop, An DeSchryver, Michiel Oele, Sipke, and Durksz, Douwe de Roest, 2002-2010.

Topics Covered

Sustainability Development
- Sustainable Development
- Triple Bottom Line
- IPAT Equation

Sustainability Indicators
- Environmental: Ecological Footprint, Carbon Footprint
- Economic: Genuine Progress Indicator
- Social and Demographic: Equity

Environmental Sustainability Challenges
- Population Growth
- Resource Depletion
- Global, Regional, and Local Environmental Damage

Materials and the Environment
- Renewable vs Non-renewable
- Embedded Energy
- Production, Consumption, and Waste
- Air Pollution Emissions
- Water Pollutant Discharges
- Solid Wastes (Hazardous, Industrial, MSW)

Environmental Pollutants
- Ozone Depleting Chemicals
- Global Warming Gases
- Nutrients and Non-Hazardous Substances
- Toxic Chemicals
- Acids and Metals
- Radioactive Substances

Material Flow Analysis
- Steady- and Non-Steady State
- Conversion of Mass to Energy
- Process Input/Output/Recycle Analysis
- Chemical Reactions Kinetics
- Air and Water Quality Modeling

Environmental Impact Indicators
- EPA TRACI Approach
- Global Warming Potential
- Ozone Depletion Potential
- Photochemical Smog
- Acidification
- Eutrophication
- Cancer and Non-Cancer Risk
- Land, Water, and Fossil Fuel Use

Energy Sources and the Environment
- Power Plants and Electricity
- Energy Efficiency and Operation
- Renewable Energy Sources
- Buildings and Transportation Sectors
- Emission Reductions

Environmental & Natural Resource Economics
- Time Value of Money
- Cost–Benefit Analysis
- Life Cycle Costs

Sustainable Environmental and Design Assessment Tools
- Risk Assessment
- Life Cycle Assessment (LCA)
- Boundary Setting and Goal Development
- Inventory Analysis
- Impact Analysis
- Improvement Analysis

Case Studies and LCA Examples
- Material Choices (Plastics, Metals, Cements)
- Products (Microchips, Refrigerators)
- Systems (Urban Development)
- Green Building Design (LEEDS)
- Green Infrastructure: Energy, Water, and Transportation

THE UNIVERSITY OF MICHIGAN -- COLLEGE OF ENGINEERING
Course Approval Request
College Curriculum Committee, 1420 Lurie Engineering Center Building

Form Number: 2189
Date: 12/13/2010
Effective Term: Winter 2013
Course Offer Freq: ☒ Indefinitely ☐ One term only

Action Requested
◉ New Course
○ Modification of Existing Course
○ Deletion of Course

Complete the following sections:
New Courses - B & C completely
Modifications - A modified information, B & C completely
Deletions - A & C completely

A. CURRENT LISTING	B. REQUESTED LISTING
Home Department / Course Number	Home Department: CEE Civil & Environmental Engin / Course Number: 319
Cross Listed Course Information	Cross Listed Course Information
Course Title	Course Title: Sensors, Electrical Circuits, and Signal Processing
TITLE ABBREVIATION — Time Sched Max = 19 Spaces	Sensors and Circuits
TITLE ABBREVIATION — Transcript Max = 20 Spaces	Sensors and Circuits
Course Description	Course Description for Official Publication (Max = 50 words): This course introduces students to the fundamentals of collecting and processing experimental data for civil and environmental applications. The course begins with an introduction to DC and AC circuits followed by the coverage of sensors used in the civil and environmental field. Examples and hands-on demonstrations will be presented relevant to seismic, environmental, structural and hydraulic monitoring.
PROGRAM OUTCOMES: ☐ a ☐ b ☐ c ☐ d ☐ e ☐ f ☐ g ☐ h ☐ i ☐ j ☐ k	PROGRAM OUTCOMES: ☒ a ☒ b ☒ c ☒ d ☒ e ☐ f ☐ g ☐ h ☐ i ☐ j ☒ k
Degree Requirements: ○ Degree Requirement ○ Core Course ○ Free Elective ○ Tech Elective ○ Other	Degree Requirements: ◉ Degree Requirement ○ Core Course ○ Free Elective ○ Tech Elective ○ Other
Prereq: ○ Enforced ○ Advised	Prereq: Physics 240. ○ Enforced ◉ Advised
Credit Restrictions	Credit Restrictions
Level of Credit: ☐ Undergrad only ☐ Rackham Grad ☐ Non-Rckhm Grad ☐ Ugrad or Rckhm Grad ☐ Ugrad or Non-Rckhm Grad ☐ All Credit types ☐ Rckhm Grad w/add'l Work; Credit Hours Min / Max; Contact Hrs/Wk; Number of Wks	Level of Credit: ☐ Undergrad only ☐ Rackham Grad ☐ Non-Rckhm Grad ☐ Ugrad or Rckhm Grad ☒ Ugrad or Non-Rckhm Grad ☒ All Credit types ☐ Rckhm Grad w/add'l Work; Credit Hours Min 3 / Max 3; Contact Hrs/Wk 3; Number of Wks 14

C.

Repeatability (Indi Research, Dir. Study, Dissertation): Is this course repeatable? ○ Yes ◉ No; Max Hours? 3; Max Times? 1; Can it be repeated in the same term? ○ Yes ◉ No

Class Type(s): ☒ Lec ☐ Sem ☐ Dis ☐ Other ☐ Rec ☐ Lab ☐ Ind
Graded Section: ☒ Lec ☐ Sem ☐ Dis ☐ Other ☐ Rec ☐ Lab ☐ Ind
Grading: ☒ A-E ☐ CR/NC ☐ P/F ☐ S/U
Location: ☒ Ann Arbor ☐ Biological Station ☐ Camp Davis ☐ Extension
Course Is Y Graded ☐

Cognizant Faculty Member: Jerome P. Lynch — Title: Associate Professor

Grad Course: Attach nomination if Cognizant Faculty is not a regular graduate faculty

Approval Info	Approved by Name	Approved Date
☐ Curriculum Comm.		
☐ Faculty		
☐ Cross listed Unit 1		
☐ Cross listed Unit 2		

Submitted By: ☒ Home Dept. ☐ Cross-listed Dept.

	Department Chair Name	Chair Signature
Home Dept.	Roman D. Hryciw, Assoc. Chair	Roman Hryciw
Cross-listed Dept(s).	Civil & Environmental Engin	

Form Number

2189

SUPPORTING STATEMENT

This course introduces civil and environmental engineering students to the fundamental concepts that underlie the collection and processing of experimental data. The course begins with an introduction to electrostatics followed by direct current (DC) and alternating current (AC) circuit analysis. Thereafter, the course will introduce the concepts of electro-mechanical and electro-chemical transduction as a means of teaching how sensors work. A survey of traditional and emerging sensors will be presented. The course concludes with an introduction to data management including digital signal processing methods. In addition, a variety of hands-on demonstrations and experiments will be conducted by the students to deepen their appreciation for the course material, particularly in how course material is used in real-world civil and environmental engineering applications.

Are any special resources or facilities required for this course? ☐ Yes ☒ No

Detail the Special requirements

CEE319 – Sensors, Electrical Circuits, and Signal Processing

Introduction:
This course introduces civil and environmental engineering students to the fundamental concepts that underlie the collection and processing of experimental data. The course begins with an introduction to electrostatics followed by direct current (DC) and alternating current (AC) circuit analysis. Thereafter, the course will introduce the concepts of electro-mechanical and electro-chemical transduction as a means of teaching how sensors work. A survey of traditional and emerging sensors will be presented with a particular emphasis on sensors used in the field of civil and environmental engineering. The course concludes with an introduction to data management including digital signal processing methods. In addition, a variety of hands-on demonstrations and experiments will be conducted by the students to deepen their appreciation for the course material, particularly in how course material is used in real-world civil and environmental engineering applications (e.g., structural monitoring systems, large-scale experimental testing facilities, environmental monitoring, among others). Hands-on modules will focus on laboratory experiments in the design of band-pass and anti-aliasing filters, the design of accelerometers for seismic monitoring, and the processing of sensor data collected from structural monitoring systems.

Tentative Course Schedule:
Week 1 – Introduction to Electrostatics
Week 2 – DC Circuit Analysis
Week 3 – DC Circuit Analysis
Week 4 - AC Circuit Analysis
Week 5 – AC Circuit Analysis
Week 6 - Electrical Filters
Week 7 – Introduction to Data Acquisition Systems
Week 8 – Strain, Pressure and Displacement Sensors (including optical sensors)
Week 9 – Vibration Sensors
Week 10 – Chemical Sensors
Week 11 – Emerging Sensor Technologies (e.g., MEMS)
Week 12 – Data Management Technologies
Week 13 – Digital Signal Processing
Week 14 – Digital Signal Processing

Course Description for Official Publication:
This course introduces students to the fundamentals of collecting and processing experimental data in the CEE field. The course begins with an introduction to DC and AC circuits. The design and operation of sensors are then introduced followed by an introduction to digital signal processing.

Grading Policy:
The course will be graded based on the submission of weekly homework assignments (~25%), midterm (~30%), final (~30%), and term project (~15%).

Proposed Textbooks:

- Paul, Nasar, Unnewer "Introduction to Electrical Engineering," McGraw-Hill, NY, NY
- Fraden, "Handbook of Modern Sensors," AIP Press, NY, NY

THE UNIVERSITY OF MICHIGAN -- COLLEGE OF ENGINEERING
Course Approval Request
College Curriculum Committee, 1420 Lurie Engineering Center Building

Form Number: 2197
Date: 2/7/2011
Effective Term: Winter 2012
Course Offer Freq: ☒ Indefinitely ☐ One term only

Action Requested
- ○ New Course
- ◉ Modification of Existing Course
- ○ Deletion of Course

Complete the following sections:
New Courses - B & C completely
Modifications - A modified information, B & C completely
Deletions - A & C completely

A. CURRENT LISTING	B. REQUESTED LISTING
Home Department: CEE Civil & Environmental Engin	Home Department: CEE Civil & Environmental Engin
Course Number: 581	Course Number: 581
X Cross Listed Course Information:	Cross Listed Course Information: GEOSCI Geological Sciences 581
Course Title: Aquatic Chemistry	Course Title: Aquatic Chemistry
TITLE ABBREVIATION — Time Sched Max = 19 Spaces: Aquatic Chemistry	TITLE ABBREVIATION — Time Sched Max = 19 Spaces: Aquatic Chemistry
TITLE ABBREVIATION — Transcript Max = 20 Spaces: Aquatic Chemistry	TITLE ABBREVIATION — Transcript Max = 20 Spaces: Aquatic Chemistry
X Course Description: Chemical principles applicable to the analysis of the chemical composition of natural waters and engineered water systems; chemistry of water purification technology and water pollution control; chemical processes which control the movement and fate of trace contaminants in aquatic environments including precipitation-dissolution, oxidation-reduction, adsorption-desorption, and complexation.	Course Description for Official Publication (Max = 50 words): Chemical principles applicable to the analysis of the chemical composition of natural waters and engineered water treatment systems; covers acid-base, precipitation-dissolution, complexation, and oxidation-reduction reactions; emphasis on graphical, analytical, and computer-speciation methods; presented in the context of contemporary environmental issues including water quality, climate change, and pollution prevention and abatement.
PROGRAM OUTCOMES: ☐ a ☐ b ☐ c ☐ d ☐ e ☐ f ☐ g ☐ h ☐ i ☐ j ☐ k	PROGRAM OUTCOMES: ☐ a ☐ b ☐ c ☐ d ☐ e ☐ f ☐ g ☐ h ☐ i ☐ j ☐ k
Degree Requirements: ○ Degree Requirement ○ Core Course ○ Free Elective ○ Tech Elective ○ Other	Degree Requirements: ○ Degree Requirement ○ Core Course ○ Free Elective ○ Tech Elective ○ Other
Prereq: Chem 125.	Prereq: Chem 125 or equivalent.
X ◉ Enforced ○ Advised	○ Enforced ◉ Advised
Credit Restrictions:	Credit Restrictions:
Level of Credit: ☐ Undergrad only ☐ Rackham Grad ☐ Non-Rckhm Grad ☒ Ugrad or Rckhm Grad; ☐ Ugrad or Non-Rckhm Grad ☐ All Credit types ☐ Rckhm Grad w/add'l Work	Level of Credit: ☐ Undergrad only ☐ Rackham Grad ☐ Non-Rckhm Grad ☐ Ugrad or Rckhm Grad; ☐ Ugrad or Non-Rckhm Grad ☒ All Credit types ☐ Rckhm Grad w/add'l Work
X Credit Hours Min 3 Max 3; Contact Hrs/Wk 4; Number of Wks 14	Credit Hours Min 3 Max 3; Contact Hrs/Wk 4; Number of Wks 14

C.
Repeatability (Indi Research, Dir. Study, Dissertation: Is this course repeatable? ○ Yes ◉ No Max Hours? 3 Max Times? 1 Can it be repeated in the same term? ○ Yes ◉ No

Class Type(s): ☒ Lec ☐ Sem ☐ Dis ☐ Other ☐ Rec ☒ Lab ☐ Ind
Graded Section: ☐ Lec ☐ Sem ☐ Dis ☐ Other ☐ Rec ☐ Lab ☐ Ind
Grading: ☒ A-E ☐ CR/NC ☐ P/F ☐ S/U
Location: ☒ Ann Arbor ☐ Biological Station ☐ Camp Davis ☐ Extension
Course Is Y Graded ☐

Cognizant Faculty Member: Kim F. Hayes, CEE — Title: Professor
Joel Blum, GeoSci — Professor

Grad Course: Attach nomination if Cognizant Faculty is not a regular graduate faculty

Approval Info / Approved by Name / Approved Date
- ☐ Curriculum Comm.
- ☐ Faculty
- ☐ Cross listed Unit 1
- ☐ Cross listed Unit 2

Submitted By: ☒ Home Dept. ☐ Cross-listed Dept.

	Department Chair Name	Chair Signature
Home Dept.	Civil & Environmental Engin	Roman D. Hryciw, Assoc. Chair
Cross-listed Dept(s).	Geological Sciences	Brenda Pluijm

Form Number

2197

SUPPORTING STATEMENT

This request for cross-listing CEE 581 with Geologic Sciences is being proposed for two reasons:

1. Each year a flyer is sent to selected Geologic Science faculty to encourage their graduate students to enroll in CEE 581. This has typically led to 3-4 Geology graduate students enrolling in the class. During the past year, the Department of Geologic Sciences (GS) has been developing a strategic plan that includes a name change to the Department of Earth and Environmental Sciences (under review for approval). It is therefore timely to cross-list CEE 581 (proposed as GEOSCI 581) in GS to attract both undergraduate and graduate GS students to the class. This should provide a steady and greater stream of students from GS in the course.

2. As part of our undergraduate curriculum changes in CEE and a forthcoming proposal for a new accredited ABET program in Environmental Engineering, we are looking for appropriate Earth Sciences classes to cover the new ABET Earth Sciences requirement. With the cross-listing of CEE 581 in GS and increased enrollments from GS, this should provide convidence to ABET reviewers of the appropriateness of this course to be on that list.

Are any special resources or facilities required for this course? ☐ Yes ☒ No

Detail the Special requirements

CEE 581
AQUATIC CHEMISTRY
Winter Term 2011

Instructor:	Professor Kim F. Hayes, EWRE 181 (ford@umich.edu)
Office Hours:	MW 10:30 - 11:30 PM (or by appointment)
Lectures:	MWF 9:30 -10:30 AM (EWRE 185)
Computer Laboratory:	F: 2:00 - 4:00 PM (Media Union)
Required Text:	Principles and Applications of Aquatic Chemistry, Francois M.M. Morel and Janet G. Hering, John Wiley and Sons, NY, 1993.
***Supplemental Reading**: Companies, Inc.,	Water Chemistry, M. M. Benjamin, McGraw-Hill NY, 2002.
	Aquatic Chemistry Concepts, James F. Pankow Lewis Publishers, Inc., Michigan, 1991.
	Aquatic Chemistry, W. Stumm and J. Morgan 3rd Ed., John Wiley and Sons, NY, 1996.
	Course Notes Pack (CNP)-Handouts.

*** On reserve in Engineering Library in Media Union**

Grading: The course grade will be based on homework, the computer project, and three exams. A five percent per day penalty will be assessed for late homework or computer assignments. Homework not turned in by 5 PM on the day it is due will be considered late.

Computer Term Project	15%
Homework	20%
Exam I	20%
Exam II	20%
Final Exam	25%

Homework and Computer Assignments: You may work with other class members for the purpose of solving the homework and computer problems. Each person, however, is responsible for generating their own solutions for grading.

Honor Code: Only materials explicitly provided for this class by the instructor or the teaching assistant may be used for solving the computer or homework problems or studying for exams. Any access to unauthorized material will be considered a violation of the honor code. You are not allowed to possess, look at, use, or in anyway derive advantage from the existence of solutions prepared in prior years, whether these solutions were former students' work or copies of solutions that had been made available by me. Violation of this policy is grounds for me to initiate an action that would be filed with the

Dean's office and would come before the College of Engineering's Honor Council. If you have any questions about this policy, please do not hesitate to contact me.

Course Description:

This course provides an introduction to the principles of aquatic chemistry and reactions applicable to the analysis of the chemical composition of natural water and engineered water treatment systems. Four chemical reaction classes are covered: (1) acid-base, (2) precipitation-dissolution, (3) complexation, and (4) oxidation-reduction reactions. Emphasis is placed on developing problem solving skills and includes the use of graphical, analytical (e.g., the Tableaux method), and computer solution (MINEQL+) techniques. Problems are selected from a host of environmentally relevant systems including the geochemistry of natural waters, water treatment, groundwater remediation, and fate of inorganic pollutants in natural aquatic systems. Lectures present aquatic chemical principles in the context of contemporary environmental issues including water quality, climate change, and pollution prevention and abatement.

CEE 581 AQUATIC CHEMISTRY

Week	Date	Topic	Reading		
			MH	B	CNP
1	Jan. 5	Organizational Meeting Course Overview	1-8	1-19	**1-16**
	Jan. 7	Chemical Equilibrium	40-56	35-40	**17-27**
2	Jan. 10	Chemical Equilibrium Standard Free Energies	45-56	104-110	**27-35**
	Jan. 12	Reference/Standard States Effects of Temperature/Pressure	82-87	19-34 119-122	**38-40**
HW#1	Jan. 14	Reference/Standard States Activity Corrections	70-82	28-34	**40-50** **86-87**
3	Jan. 17	Martin Luther King, Jr. Day No Class			
	Jan. 19	Water-Aqueous Species Electrolytes, Acids, Bases		131-144 144-146	**53-85**
HW#2	Jan. 21	Chemical Equilibrium Calcs. Components and Tableaux	**9-31** **56-63**	169-182 203-236 294-308	**110-111**
4	Jan. 24	Chemical Equilibrium Calcs. Strong Acid/Base Systems	56-63	170-172	**112-113**
	Jan. 26	Chemical Equilibrium Calcs. Weak Acid/Base Systems	**56-63**	172-177	**116-117**
HW#3	Jan. 28	Chemical Equilibrium Calcs. Diprotic Acid/Base Systems	**56-63**	181-185	**118-121** **114-115**
5	Jan. 31	Chemical Equilibrium Calcs. Diprotic Acid/Base Systems	**56-63**	181-185	**118-121**
	Feb. 2	Chemical Equilibrium Calcs. Acid Mixtures/Principal Components	**56-63**	218-229	**122-125**
HW#4	Feb. 4	Chemical Equilibrium Calcs. Graphical Methods	**63-70**	188-202 154-161	**99-103** **126-127**

Week	Date	Topic	Reading		
			MH	B	CNP
6	Feb. 7	Chemical Equilibrium Calcs. Graphical Methods-Ion. Frac.	**178-181**	150-154	**128-132** **104-108**
	Feb. 9	Chemical Equilibrium Calcs. Graphical Methods-Open Systems	**182-185**	322-358	**133-135**
	Feb. 11	Chemical Equilibrium Calcs. Equivalence Points/Titrations	**157-174**	237-287	**136-138** **149-152**
7	Feb. 14	Diprotic Acids/Titrations and Recipes	**157-174**	249-261	
	Feb. 16	Review	EXAM I (7-9PM)		
	Feb. 18	Titrations and Alkalinity	**157-191**	260-276	
8	Feb. 21	Alkalinity Calculations	**166-195**	264-273	
	Feb. 23	Alkalinity Calculations	**166-195**	264-273	
HW#5	Feb. 25	Alkalinity Calculations	**166-195**	264-273	
9	Mar. 7	Buffer Capacity (actual-alkalinity calcs. cont.)	**210-218**	276-286	**153-162**
	Mar. 9	Complexation Metal Ion Hydrolysis	**319-358**	362-370	**163-169**
HW#6	Mar. 11	Complexation Inorganic Ligands	**319-358**	370-381	**163-170**
10	Mar. 14	Complexation Inorganic Ligands	**319-358**	370-381	**140-144**
	Mar. 16	Complexation Inorganic Ligands	**319-358**	370-381	**140-144**
HW#7	Mar. 18	Complexation Organic Ligands (Inorganic ligand in excess)	**358-375**		**145-148**
11	Mar. 21	Heterogeneous Equilibria Introduction	**236-254**	394-399 430-431	
	Mar. 23	Heterogeneous Equilibria pC-pH Solubility Diagrams	**249-252**	399-403 411-413	**171-172**

	Week	Date	Topic		Reading
			MH	B	CNP
HW#8	Mar. 25	Heterogeneous Equilibria Open System, Critical pH	**254-261**	230-264	**177-184**
12	Mar. 28	Heterogeneous Equilibria Closed System, Critical pH Carbonate Solids and Alk	**254-261**	409-411 417-420	**185-194**
	Mar. 30	Heterogeneous Equilibria Solids Coexistence, ARD	**261-276**	404-409 421-430	**195-207**
	Apr. 1	Oxidation/Reduction Concept of pe	**421-434**	316-338	**208-209**
13	Apr. 4	Natural pe controls	**434-451** **CN**	501-511	**210**
	Apr. 6	Review	EXAM II (7-9PM)		
HW#9	Apr. 8	pe Controls ARD	**434-451**		**211-213**
14	Apr. 11	Case Study (Cr wastewater-wetlands)	Handouts		**214**
	Apr. 13	Case Study (Cr wastewater-wetlands)	Handouts		**214**
	Apr. 15	(Term Project Due) (Course Wrap Up)			
15	Apr. 18	TBA			
16	Apr. 27	Final Exam (10:30 PM - 12:30 PM)			

Reading Key:
MH: Morel and Hering (required reading)
B: Benjamin (supplemental reading)
CNP: Course Notes Pack

Bold print indicates primary reading source for lecture material

Proposal for NA&ME Combined Undergraduate/Graduate Programs with the UM-SJTU Joint Institute

Summary

We propose a Combined Undergraduate/Graduate Program (CUGP) with the UM-SJTU Joint Institute (JI) that will allow students receiving an undergraduate degree from the UM-SJTU Joint Institute to earn a MSE, MS, or MEng degree from the NA&ME department at the UM while double counting no more than 6 credit hours between their bachelor's and master's programs.

Admissions

- JI students apply for admission to the NA&ME MSE, MS, or MEng degree program by submitting the Rackham (CUGP) application or CoE MEng (CUGP) application. Statement of purpose, personal statement, letters of recommendations, ToEFL or MeLab scores, application fee, other required credentials and the JI-CUGP NA&ME Course Election Form are also required. Financial resource information will only be needed if accepted into the program.
- JI students should apply during their 3rd year at the Joint Institute.
- Students must have a minimum GPA of 3.2 and maintain this through completion of their undergraduate degree. Meeting the minimum 3.2 GPA requirement does not guarantee automatic admission.
- On the JI-CUGP NA&ME Course Election Form, applicants need to list JI courses proposed for double counting and a plan of study for the master's, both approved by the CUGP undergraduate advisor.
- The NA&ME department will make admission decisions based on the qualifications of the applicant and the number of students the program can accommodate.
- An admission decision and pre-enrollment materials will be sent by email. Applicant will be able to receive an admission letter if requested.

NA&ME CUGP Requirements

- Students admitted to the NA&ME CUGP will enroll in the chosen master's program upon completion of their JI undergraduate degree. The undergraduate degree must be awarded before matriculation into the master's program.
- Students must enroll in the masters program for at least two full terms, paying full tuition.
- Students must complete at least 24 credit hours in residence at the UM Ann Arbor.
- Students may not be simultaneously enrolled in any other UM program.

Proposal for NA&ME Combined Undergraduate/Graduate Programs with the UM-SJTU Joint Institute

- Students may count up to 6 credits from their SJTU JI bachelor's degree towards the master's. These are the "double counted" credits. This happens by transferring the courses to their UM transcript. If the specific courses from which the double counted credits are to come total more than 6 credit hours, then all of the credits appear on the graduate transcript, but only 6 count towards the 30 required for the master's degree. The balance of any credit hours cannot be counted toward any other graduate program at UM or SJTU. The balance can count towards an undergraduate program at the JI.

Requirements for Double Counting credits

- Credits must be graduate level
- Credits must be taken during the Junior or Senior year.
- Must have received a grade of B or better.
- Credits must be acceptable towards the 30 credit Master's requirement.
- Credits must be approved by the graduate program and also by the undergraduate program. (The NA&ME department is already in contact with the Manager of Undergraduate Education and Student Affairs, Yelena Zhao, from the Shanghai Jiao Tong University).
- Credits must not be part of the required undergraduate courses, but courses elected to meet technical or general electives at the JI can be double counted.

THE UNIVERSITY OF MICHIGAN COLLEGE OF ENGINEERING

Course Approval Request
College Curriculum Committee, 1420 Lurie Engineering Center

Form Number (_____)
Date _____
Effective term _____
Course Offer Frequency

Action Requested
__ New Course – Complete sections B & C completely
__ Modification of Existing Course – Complete B & C completely, modified sections in A,
__ Deletion of Course – Complete A & C completely

A.. CURRENT LISTING

Home Department / Subject Catalog Number

Cross-listed course information

Course title (full title)

Abbreviated Title (20 char)

Course description

Prerequisites __ Enforced __ Advised
(include minimum grade required in enforced prerequisites if other than a C-)

Credit restrictions:

Class length ____ Full term ____ Half term
Credit hours/week ____ Min ____ Max
__ Lec hrs/wk __ Rec hrs/wk __ Lab hrs/wk

Level of credit
_ Undergrad only
_ Rackham grad
_ Non-Rckhm Grad
_ UG or Rckhm Grad
_ UG of Non-Rckhm Grad
_ All credit types
_ Rckhm Grad w/add'l work

B. REQUESTED LISTING

Home Department / Subject Catalog Number

Cross-listed course information

Course title (full title)

Abbreviated Title (20 char)

Course description

Prerequisites __ Enforced __ Advised
(include minimum grade required in enforced prerequisites if other than a C-)

Credit restrictions:

Class length ____ Full term ____ Half term
Credit hours/week ____ Min ____ Max
__ Lec hrs/wk __ Rec hrs/wk __ Lab hrs/wk

Level of credit
_ Undergrad only
_ Rackham grad
_ Non-Rckhm Grad
_ UG or Rckhm Grad
_ UG of Non-Rckhm Grad
_ All credit types
_ Rckhm Grad w/add'l work

Course is repeatable for credit __ Yes __ No Max Hours ____ Max Times ____
Course can be taken more than once in same term __ Yes __ No
Class type(s) __ Lec __ Sem __ Rec __ Dis __ Lab __ Ind __ Other _____
Graded Section __ Lec __ Sem __ Rec __ Dis __ Lab __ Ind __ Other _____
Grading scale __ A-E __ S/U __ P/F __ Not for credit __ Not for degree credit
Y grade allowed __Y _ N

Approval Info	Approved by Name	Approved Date
Curriculum Comm	_____	_____
College Faculty	_____	_____
Cross-listed unit 1	_____	_____
Cross-listed unit 2	_____	_____

Submitted by __ Home dept __ Cross-listed dept
Department Chair Name Chair signature
Home dept. _____
Cross-listed dept(s): _____
_____

Form Number _____

Describe how this course fits with degree requirements (e.g. Required course for all students in BSE EE program)

If this is an undergraduate course used to meet ABET departmental program outcomes, check off the program outcomes met by this course and **attach a course profile**:

a) an ability to apply knowledge of mathematics, science, and engineering
b) an ability to design and conduct experiments, as well as to analyze and interpret data
c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
d) an ability to function on multi-disciplinary teams
e) an ability to identify, formulate, and solve engineering problems
f) an understanding of professional and ethical responsibility
g) an ability to communicate effectively
h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i) a recognition of the need for, and an ability to engage in life-long learning
j) a knowledge of contemporary issues
k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Are any special resources of facilities required for this course? __ Yes __ No If yes, detail the special requirements

SUPPORTING STATEMENT – Explain the rationale for the requested course or course changes.

Cognizant Faculty Member: Title: Signature:

_____ _____ _____

~~(2000 document duplicated in Word from PDF version Jan 2011)~~

COLLEGE OF ENGINEERING

POLICY FOR CONCENTRATIONS

Based on 2000 memo to the faculty, approved 3/20/00

Updates submitted for consideration at the February 22, 2011 College Curriculum Committee

~~Memorandum (Hand-written note "approved 3/20/00")~~

~~To: CoE Faculty~~
~~From: CoE Curriculum Committee (Peter Washabaugh, Chair for the Committee)~~
~~Date: 3/29/00~~
~~Re: Concentrations – DRAFT 3.0~~

One of the elements of curriculum reform has been to incorporate into our educational programs a certain degree of flexibility in the form of general ~~free~~ and technical electives. In some cases, it is clear to a student and a prospective employer that a certain sequence of courses corresponds to a particular area of study. However, in other cases it is not obvious that a particular sequence of courses might have any relation to each other when in fact they do.

Here we propose to create a framework to encourage students to elect a certain coherent sequence of electives. We call this sequence a "concentration". The expectation is that this will improve a student's education, and it will encourage the development of course offerings by the faculty in the College and perhaps in the rest of the University. A concentration will be an endorsement by the faculty that a student has fulfilled a certain area of study.

The definition of a Concentration is as follows:

1) The term "Concentration in <identifier>" will appear in the student's transcript, but not the Diploma.

2) It consists of an approved sequence of courses that are a minimum of 12 credit hours and count toward elective requirements of a program. The 12 credit hours must include at least one course at the 300 or 400 level.

3) A student must earn an overall GPA of at least a 2.0 in courses taken to meet the requirements of a concentration.

3)4) The administrative responsibility for a concentration rests solely with the Program Advisor for the degree. The Program Advisor for the degree is responsible for advising and auditing the degree and concentration requirements.

Comment [SMM1]: SUSAN RECALLS THIS BEING IN FINAL VERSION OF DOCUMENT

Comment [SMM2]: ADDED REQUIREMENT, 2.0 NEEDED FOR MINORS, FELT IT SHOULD BE FOR CONCENTRATIONS AS WELL

~~4)~~5) The creation of a concentration is a program change, which requires the approval of the Faculty.

~~5)~~6) It is recommended that the number of credit hours to obtain a concentration be contained within a usual degree. A concentration that requires additional coursework requires justification.

~~9/6/07~~

~~Proposal for Engineering minors~~

COLLEGE OF ENGINEERING
POLICY FOR ENGINEERING MINORS
SUBMITTED TO THE COLLEGE CURRICULUM COMMITTEE MEETING
DATEOFNEXTMEETING

Undergraduate students enrolled in a College of Engineering degree program can often benefit from study and practice at some depth outside of their major. An engineering minor is a coherent program of study, but with requirements far less comprehensive than those of a BS or BSE degree. Engineering minors can be sponsored by CoE departments, programs, or, for the purpose of supporting cross-departmental programs, sponsored by the Office of the Associate Dean for Undergraduate Education. An engineering minor is not intended to provide specialization within a student's major field.

An engineering minor will require:

1. At least 15 credit hours, including some upper division courses.
2. A minor must contain some structure and coherence and cannot simply be a requirement for a number of credit hours. A minor can contain grouping of courses and provide students with approved menus of courses within these groups.
3. Courses used to satisfy BSE or BE requirements can also be used to satisfy minor requirements.
4. ~~5.~~ Courses taken to meet the requirements of a minor must be taken for a grade. However a minor may include pass/fail courses if justified by the sponsoring department~~articulate reasons to specify a limited number of courses or credits that are graded Pass/Fail.~~
5. ~~6.~~ An engineering minor can require prerequisites.
6. ~~7.~~ To create a minor the sponsoring CoE unit will submit a curricular plan for the minor to the College of Engineering Curriculum Committee for consideration and approval/disapproval. If approved the engineering minor proposal will be forwarded to the CoE faculty for final approval/disapproval. The CoE Curriculum Committee must approve all subsequent modifications to the minor requirements (including adding or removing courses from a menu of courses).
7. ~~8.~~ The sponsoring unit is responsible for administering the minor, and must submit with the curricular plan an administrative plan that: identifies faculty/staff positions responsible for providing advising and timely auditing of the minor requirements during the student's final term. The advisor for an engineering minor will be responsible for approving variances to minor requirements for individual students.
8. ~~9.~~ For minors sponsored by the Office of the Associate Dean for Undergraduate Education, the ADUE will identify faculty to provide advising and staff to assist with advising and auditing.

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Comment [SMM1]: DELETE

Comment [SMM2]: DELETE

~~10.~~9. Students taking an engineering minor will have a notation on their CoE audit. When the student applies for her diploma the CoE registrar will contact the unit(s) sponsoring her minor(s) to request an audit of the minor requirements.

~~11.~~10. The program advisors for a minor, and their designated staff, are responsible for responding to the CoE Registrar's request for the audit of the minor requirements.

Comment [SMM3]: PURSUING

Comment [SMM4]: UPDATE RE. CURRENT AUDIT SYSTEM

Comment [SMM5]: UPDATE TO CURRENT SYSTEM

Student rules:

A. Completion of an academic minor is optional; no student can be required to complete an engineering minor.
B. A student's enrollment period will not be extended for the purposes of completing a minor (once a student has completed the requirements for their BS/BSE degree, they should not remain enrolled for the sole purpose of completing a minor).
C. A student can complete one or more engineering minors, along with one or more LSA minors. However, a minor is not intended to provide specialization within a student's major field. Therefore, the posted rules for each minor will outline any restrictions on the availability of a minor for students in particular program, e.g. "A student seeking a BSE in NERS cannot earn the minor in NERS.
D. Advanced placement credits may not be used to meet the requirements of an academic minor, but may be used to meet the prerequisites to a minor.
E. Transfer credit may not be used to fulfill the requirements of a minor unless specifically specified and justified by the proposing department.
~~E. Transfer credit may generally be used to fulfill the requirements of a minor, but specific minors may have limitations on the use of transfer credit.~~
F. Courses taken to satisfy the requirements of a minor must be taken for a grade, unless the course was specifically approved as Pass/Fail within the requirements of that minor.
G. A student must earn an overall GPA of at least 2.0 in courses taken to meet the requirements of an academic minor.
~~I.~~H. Students are responsible for notifying both the sponsoring program and their major department of their intention to pursue a minor. Such notification should take place prior to enrollment in the upper division courses for the minor.~~Such notification must take place no later than the 3rd week of the term in which they intend to graduate. Ideally notification should take place much earlier.~~
I. The advisor for each minor is responsible for approving any variance in course requirements for a minor.
J. Responsibility for auditing completion of requirements for a minor lies within the sponsoring unit.~~ (Ideally the MAIS system will make such auditing relatively easy).~~
K. Students will always be allowed to count courses towards an approved minor retroactively, as long as the minor is approved before the date of their graduation.
L. Engineering minors will be noted on a student's academic transcript, but not on her diploma.

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Notes on significant differences from LSA minors

I. LSA minors require 10 credits to be taken in residence (we require all courses to be taken in residence unless specifically allowed by rules of the minor~~ allow any number to be taken on other campuses~~).
II. LSA minors and concentrations (majors) allow double counting only one course (we allow any number of courses to be used for both major and minor; this is consistent with current CoE policy regarding LSA minors).
III. LSA minors do not allow any double counting of courses between minors (we allow any number of courses to be double counted between minors).

IV. LSA minors do not allow any Pass/Fail grading in courses used for a minor (we allow some Pass/Fail graded courses in a minor, if specifically approved in the design of the minor).