

**The University of Michigan
College of Engineering
Curriculum Committee**

Agenda

November 22, 2011

1:30-3:00 p.m.

Room 265 Chrysler Center

1. Approval of Minutes From 11-08-2011
2. Course Approval Forms
3. Proposed Changes to the CS Engineering Program—David Kieras

**University of Michigan
College of Engineering
Curriculum Committee Meeting
Tuesday November 8, 2011
1:30-3:00 p.m.
Room 265 Chrysler Center
Minutes**

Fred Terry called the meeting to order at 1:40 p.m.

Members Present: F. Terry, E. Durfee, J. Holloway, A. Hunt, D. Kieras, E. Larsen, S. Montgomery, T. Olson, T. Perakis, R. Robertson, S. Vozar, F. Ward

Members Absent: L. Bernal, Y. Bozer, A. Gallimore, J. Pan, M. Moldwir

Guest: Matt Blank

The minutes of the last meeting (October 25, 2011) were approved

The course approval form for NAME 599 was approved electronically by members vote.

Proposed BSE Degree in Environmental Engineering--Revisited

This slightly revised proposal was included in the meeting packet. This was introduced at the October 11 CoE CC meeting and also brought to the previous (October 25) meeting. Information regarding this Proposal was included in the meeting packet.

Terri Olson continued presenting the Proposal. There was some discussion regarding this and some of the proposed courses were revised per the recommendation of this Committee.

This Proposal was approved pending the proposed revisions. There was a proposal for a vote to approve this. Moved and Seconded. Approved. This will be presented at the Faculty meeting.

Request for Official Recognition of Graham Institute's Sustainability Scholars Program—Steven Wright

This request was included in the meeting packet. Steven Wright explained this Program.

There is a relatively small number of students in this Program at this time, enrollment is limited to around 25 students per year, and that won't grow much larger than that, it will always be a small handful of Engineering students.

"The Undergraduate Sustainability Scholars Program (USSP) is seeking approval from various undergraduate schools and colleges, including the College of Engineering, to include the designation of participation in the program on the transcripts of students who complete the program requirements. Since the USSP is an interdisciplinary program, approval from the academic units of involved students will be required in order to pursue the transcript designation with the Registrar's Office. Five other schools & Colleges have agreed to allow this designation for their students and this request parallels requests made of the other academic units. It was noted that this would be similar to the Minors the College has now. There was a proposal for a vote to approve this. Moved and Seconded. Approved. This won't need to be presented at the Faculty meeting.

Course Approval Forms

These Courses Were Approved:

BME 350 Modification—Changed Title from: Introduction to Biomedical Instrumentation Design *to: **Introduction to Biomedical Engineering Design***, Changed Description, Changed Level of Credit from: Credit Hours Min 4 Max 4 Contact Hrs/Week *to: **Credit Hours Min 3 Max 3 Contact Hrs/Week 3***

BME 451 New Course

BME 474 New Course

These Courses Were Approved Pending Approved Changes

BME 450 Modification—Changing Title from: Biomedical Design *to: **Biomedical Engineering Design***, Changing Pre-req from: BME 458 and senior or graduate standing *to: **BME 458 and senior standing***

BME 452 New Course

These courses were tabled due to time constraints:

BME503 New Course

BME 574 New Course

BME 594 New Course

Adjournment: Motion to adjourn was made and seconded

Motion carried (approved)

Next Meeting: November 22, 2011 Room 265 Chrysler Center

COURSE APPROVAL FORMS

For November 22, 2011 CoE CC Meeting

AOSS 474	(X-Listed with EARTH 474	New Course
BME 503		New Course
BME 574		New Course
BME 594		New Course
ENGR 290		New Course
ENGR 390		Modification—Allowing course to be repeatable
NERS 531		Modification—Adding X-Listing with EARTH 529
NERS 621		Modification—Adding X-Listing with EARTH 620
NERS 490		Modification—Allowing course to be repeatable
NERS 580		Modification—Changing Credit Hours and Contact Hours from: 4 <i>to</i> : 3
NERS 590		Modification—Changing Credit Hours and Contact Hours from 1-3 <i>to</i> 1-4
SI 650		Modification—Asking for Cross Listing with EECS 549

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

Date 10/26/2011

Effective Term Winter 2012

Course Offer Freq ☒ Indefinitely
☐ One term only

A. CURRENT LISTING

B. REQUESTED LISTING

Home Department		Course Number		Home Department		Course Number	
				AOSS Atmos, Oceanic & Space Sci		474	
Cross Listed Course Information				Cross Listed Course Information			
				Earth and Environmental Sciences EARTH 474			
Course Title				Course Title			
				Ice Sheets, Glaciers and Climate Change			
TITLE ABBRE- VIATION	Time Sched Max = 19 Spaces			TITLE ABBRE- VIATION	Time Sched Max = 19 Spaces	Ice and Climate	
	Transcript Max = 20 Spaces				Transcript Max = 20 Spaces	Ice and Climate	
Course Description				Course Description for Official Publication (Max = 50 words)			
				The dynamics and mass balance of ice sheets and glaciers introduced along with mathematical theories describing how ice sheets and glaciers flow and current methods of observation. The course integrates lectures, assignments and discussion of journal articles.			
PROGRAM OUTCOMES:		<input type="checkbox"/> a <input type="checkbox"/> c <input type="checkbox"/> e <input type="checkbox"/> g <input type="checkbox"/> i <input type="checkbox"/> k <input type="checkbox"/> b <input type="checkbox"/> d <input type="checkbox"/> f <input type="checkbox"/> h <input type="checkbox"/> j		PROGRAM OUTCOMES:		<input checked="" type="checkbox"/> a <input type="checkbox"/> c <input type="checkbox"/> e <input checked="" type="checkbox"/> g <input checked="" type="checkbox"/> i <input checked="" type="checkbox"/> k <input checked="" type="checkbox"/> b <input checked="" type="checkbox"/> d <input type="checkbox"/> f <input type="checkbox"/> h <input type="checkbox"/> j	
Degree Requirements		<input type="radio"/> Degree Requirement <input type="radio"/> Free Elective <input type="radio"/> Other <input type="radio"/> Core Course <input type="radio"/> Tech Elective		Degree Requirements		<input type="radio"/> Degree Requirement <input checked="" type="radio"/> Free Elective <input type="radio"/> Other <input type="radio"/> Core Course <input type="radio"/> Tech Elective	
Prereq				Prereq Math 115 and 116			
<input type="radio"/> Enforced <input type="radio"/> Advised				<input type="radio"/> Enforced <input checked="" type="radio"/> Advised			
Credit Restrictions				Credit Restrictions			
Level of Credit		Credit Hours		Level of Credit		Credit Hours	
<input type="checkbox"/> Undergrad only <input type="checkbox"/> Ugrad or Non-Rckhm Grad <input type="checkbox"/> Rackham Grad <input type="checkbox"/> All Credit types <input type="checkbox"/> Non-Rckhm Grad <input type="checkbox"/> Rackham Grad w/add'l Work <input type="checkbox"/> Ugrad or Rackhm Grad		Min Max		<input type="checkbox"/> Undergrad only <input type="checkbox"/> Ugrad or Non-Rckhm Grad <input type="checkbox"/> Rackham Grad <input type="checkbox"/> All Credit types <input type="checkbox"/> Non-Rckhm Grad <input type="checkbox"/> Rackham Grad w/add'l Work <input type="checkbox"/> Ugrad or Rackhm Grad		Min Max	
						13	
		Contact Hrs/Wk				Contact Hrs/Wk	
		Number of Wks				Number of Wks	
						13	

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

Class Type(s)		Grading		Location		Cognizant Faculty Member:		Title	
<input checked="" type="checkbox"/> Lec <input type="checkbox"/> Sem <input type="checkbox"/> Dis <input type="checkbox"/> Other <input type="checkbox"/> Rec <input type="checkbox"/> Lab <input type="checkbox"/> Ind		<input checked="" type="checkbox"/> A-E <input type="checkbox"/> CR/NC <input type="checkbox"/> P/F <input type="checkbox"/> S/U		<input checked="" type="checkbox"/> Ann Arbor <input type="checkbox"/> Biological Station <input type="checkbox"/> Camp Davis <input type="checkbox"/> Extension		Jeremy N. Bassis		Assistant Professor	
Graded Section									
<input checked="" type="checkbox"/> Lec <input type="checkbox"/> Sem <input type="checkbox"/> Dis <input type="checkbox"/> Other <input type="checkbox"/> Rec <input type="checkbox"/> Lab <input type="checkbox"/> Ind									
		Course Is Y Graded <input type="checkbox"/>							
Approval Info		Approved by Name		Approved Date		Submitted By: <input checked="" type="checkbox"/> Home Dept. <input type="checkbox"/> Cross-listed Dept.			
<input type="checkbox"/> Curriculum Comm.									
<input type="checkbox"/> Faculty						Department Chair Name		Chair Signature	
<input type="checkbox"/> Cross listed Unit 1						Home Dept. Atmos, Oceanic & Space Sci		<i>Mark Smith</i>	
<input type="checkbox"/> Cross listed Unit 2						Cross-listed Earth & Environmental Sci		<i>Peter G...</i>	
						Dept(s):			

SUPPORTING STATEMENT

The department of Atmospheric, Oceanic and Space Sciences offers students the opportunity to specialize in climate science as part of our Earth System Science and Engineering undergraduate degree that is offered jointly with the department of Earth and Environmental Sciences. This class is offered as a technical elective that undergraduate students enrolled in this program can take to broaden their background in climate science beyond atmospheric science to include the cryosphere and the impact the changing glaciers and ice sheets have on the climate and water resources. The course serves a similar purpose in our graduate curriculum as one of the few climate courses our department offers that exposes graduate students to an important part of climate science outside of atmospheric science. We anticipate attracting PhD graduate students from Atmospheric, Oceanic and Space Sciences (AOSS), Earth and Environmental Sciences (EES) and the School of Natural Resources and the Environment (SNRE) well as Masters of Engineering students from our Applied Climate program and undergraduates from AOSS and EES.

This course was well received as indicated by Q1 & Q2: Winter 2010 Q1= 4.67, Q2= 5; Winter 2011 Q1= 4.08, Q2= 4.2

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

Detail the Special requirements

AOSS 605: Ice sheets, glaciers and climate

Syllabus, Winter 2011

Instructor: Dr. Jeremy Bassis
Office location: 2529 SRB
Office hours: TBD
Class Times: MWF 8:30-9:30AM

Primary textbook:
Principles of Glacier Mechanics, Hooke, 2nd Ed., 2005

Additional resources:
The Physics of Glaciers, Cuffey and Paterson, 4th Ed., 2010
Fundamentals of Glacier Dynamics (C.J. van der Veen, 1999)
Ice Sheets and Climate (Oerlemans and van der Veen, 1984)

Course Overview: Ice sheets and glaciers form an active component of the climate and hydrological systems that not only respond to climate, but also help shape the Earth's climate system. In this class students will be introduced to techniques used to observe and understand the dynamics and mass balance of ice sheets and glaciers. Course content includes an introduction to continuum mechanics, the equations of glacier and ice sheet deformation, boundary conditions, ice sheet and glacier mass and energy balance (both theory and observations). In addition, we shall discuss both current topics of interest to the glaciological and climate community and how these topics are relevant to efforts to better predict future sea level rise.

Prerequisites: Familiarity with linear algebra and partial differential equations. Homework assignments will involve pencil and paper exercises and some programming/data analysis with MATLAB or alternative language of preference.

Grading Rubric:	Problem sets:	40%
	Mid-term exam:	20%
	Oral presentation:	10%
	Final student report:	20%
	Participation/in class projects:	10%

Homework Assignments: We will have approximately 10 homework assignments during the semester. No late homework will be accepted without prior consent. If you are unable to turn in an assignment on time contact me before it is due.

Oral presentation(s): Each student will choose a topic not covered in class and explain this topic to the class. Students should aim for about 15-20 minute presentations. Fellow students will evaluate the presentations.

Final Project: The final project will consist of a research proposal (less than 10 pages). The topic of the research proposal is up each student, but should involve ice sheets/glaciers or the cryosphere. The proposal will involve (i) an outline of a problem of interest containing appropriate motivation and background information; (ii) a description of a research plan specifically designed to address the problem, including relevant equations; (iii) a list of expected obstacles and difficulties. The proposal will be evaluated based on its intellectual merit using NSF criteria (see <http://www.nsf.gov/pubs/1998/nsf9891/nsf9891.pdf> for a definition and examples). NB: The research proposal is aspirational -- you don't need to do the research described in the proposal, just describe the research you propose to do.

Tentative timeline for final project:

Friday, January 28th: One paragraph proposal topic due.

Friday, February 25th: Progress report

Friday, April 1st: Rough drafts due, in class peer review

Friday, April 15th: Final paper due

Participation: Participation grades will be determined by your contributions to discussions.

Mid-term exam: A single exam is tentatively scheduled during week 10 (the exact date will depend on our final class times.)

Outline

	<u>Topic</u>	<u>Reading</u>
<u>Week 1</u>	Ice sheets, glaciers and the climate system	IPCC, Chapter 4 (p. 341-342 and p. 356-367) Hook, Chapter 1
<u>Week 2</u>	Ice sheet mass balance (theory)	Hook, Chapter 3
<u>Week 3</u>	Ice sheet mass balance (observations)	Velicogna, GRL paper Pritchard, Nature paper
<u>Week 4</u>	Ice streams and surging glaciers	<i>Paper TBD</i>
<u>Week 5</u>	Flow and fracture of a crystalline material	Hook, Chapter 4
<u>Week 6</u>	The velocity field in a glacier (the shallow ice approximation)	Hook, Chapter 5
<u>Week 7</u>	Catchup	<i>Paper TBD</i>
<u>Week 8</u>	Basal sliding (theory)	Hook, Chapter 7
<u>Week 9</u>	Basal sliding (observations)	Iverson, Science Paper Weertman Paper

<u>Week 10</u>	Subglacial hydrology (theory and observations) Exam	Hook, Chapter 8 Stearns, Nature Paper
<u>Week 11</u>	Temperature in ice sheets and glaciers	Hook, Chapter 6
<u>Week 12</u>	Ice shelves, tidewater glaciers and ice ocean interaction	Scambos, Antarctic Research Paper Holland, Nature Paper
<u>Week 13</u>	Wrap-up/Presentations	

COURSE PROFILE

Degree Program: Earth System Science and Engineering
Prepared by: Jeremy N. Bassis

Date: Oct 19, 2011

COURSE #: 474	COURSE TITLE: ICE SHEETS, GLACIERS AND CLIMATE
TERMS OFFERED: Winter	For each prerequisite below, "E" denotes Enforced and "A" denotes Advised.
TEXTBOOKS/REQUIRED MATERIAL: N/A	PREREQUISITES: MATH 115 & 116 (A)
INSTRUCTOR(S): Jeremy N. Bassis	COGNIZANT FACULTY: Jeremy N. Bassis
CoE BULLETIN DESCRIPTION: The dynamics and mass balance of ice sheets and glaciers introduced along with mathematical theories describing how ice sheets and glaciers flow and current methods of observation. The course integrates lectures, assignments and discussion of journal articles.	COURSE TOPICS: <ul style="list-style-type: none"> • Introduction to the role of ice sheets in climate change, sea level rise and water resources • Introduction to continuum mechanics • Theory and observations of glacier and ice sheet deformation • Ice sheet and glacier mass and energy balance (theory and observations) • Ice-ocean interaction • Projections of future sea-level rise • Impacts of melting glaciers and decreased snowpack on water resources • Topics of current topics of interest
COURSE STRUCTURE/SCHEDULE Lecture: 2 per week @ 75 minutes per lecture	

COURSE OBJECTIVES	<p>(1) To provide understanding of the role ice sheets and glaciers play in sea level rise, past present and future climate change and fresh water budgets and; (2) to introduce students to the observational and mathematical techniques used to observe and understand the dynamics, thermodynamics and mass balance of ice sheets and glaciers.</p>
COURSE OUTCOMES For each course outcome, links to the Program Outcomes are identified.	<p>A. Students will apply math and science skills to derive solutions for homework assignments and complete programming exercises</p> <p>B. Students will download, analyze and interpret data and compare data to the predictions of numerical models</p> <p>D. Students will collaborate on homework problems and form in-class discussion groups with Engineering students paired with LSA students</p> <p>G. Students will prepare and present in-class oral presentations and write a proposal on a topic of their choice</p> <p>I. Students will recognize the need for life long learning by reading historic and current topic papers to see how knowledge has evolved</p> <p>J. Students will read current papers introducing them to contemporary topics in glaciology and climate change</p>
ASSESSMENT TOOLS For each assessment tool, links to the course outcomes are identified.	<p>Student evaluations will be based on homework, in-class discussions, oral presentations and performance on the final project. Homework assignments will require a combination of the application of mathematical and physical reasoning and programming in MATLAB. Some problems will require that the students compare observations with theory to determine and determine which assumptions of the theory are violated by the data. Ability to communicate orally will be assessed through in-class oral presentations. Technical writing skills will be evaluated through the final project, which consists of identifying a problem and then identifying a method of solving the problem in the format of a research proposal.</p>

Course Approval Request

Form Number

2200

College Curriculum Committee, 1420 Lurie Engineering Center Building

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

Date 10/18/2011

Effective Term Fall 2011

Course Offer Freq ☒ Indefinitely
☐ One term only

A. CURRENT LISTING

B. REQUESTED LISTING

Home Department		Course Number		Home Department		Course Number	
				BIOMEDE Biomedical Engineering		503	
Cross Listed Course Information				Cross Listed Course Information			
Course Title				Course Title			
				Statistical Methods for Biomedical Engineering			
TITLE ABBRE- VIATION	Time Sched Max = 19 Spaces			TITLE ABBRE- VIATION	Time Sched Max = 19 Spaces	Statistics for BME	
	Transcript Max = 20 Spaces				Transcript Max = 20 Spaces	Statistics for BME	
Course Description				Course Description for Official Publication (Max = 50 words)			
				This course will cover descriptive statistics, probability theory, distributions for discrete and continuous variables, hypothesis testing, and analysis of variance, as well as more advanced topics. We will make connections with real problems from engineering, biology, and medicine, and computational tools, primarily R, will be used for examples and assignments.			
PROGRAM OUTCOMES:		<input type="checkbox"/> a <input type="checkbox"/> c <input type="checkbox"/> e <input type="checkbox"/> g <input type="checkbox"/> i <input type="checkbox"/> k <input type="checkbox"/> b <input type="checkbox"/> d <input type="checkbox"/> f <input type="checkbox"/> h <input type="checkbox"/> j		PROGRAM OUTCOMES:		<input type="checkbox"/> a <input type="checkbox"/> c <input type="checkbox"/> e <input type="checkbox"/> g <input type="checkbox"/> i <input type="checkbox"/> k <input type="checkbox"/> b <input type="checkbox"/> d <input type="checkbox"/> f <input type="checkbox"/> h <input type="checkbox"/> j	
Degree Requirements		<input type="radio"/> Degree Requirement <input type="radio"/> Free Elective <input type="radio"/> Other <input type="radio"/> Core Course <input type="radio"/> Tech Elective		Degree Requirements		<input type="radio"/> Degree Requirement <input type="radio"/> Free Elective <input checked="" type="radio"/> Other <input type="radio"/> Core Course <input type="radio"/> Tech Elective	
Prereq				Prereq Graduate standing or permission of instructor			
<input type="radio"/> Enforced <input type="radio"/> Advised				<input type="radio"/> Enforced <input checked="" type="radio"/> Advised			
Credit Restrictions				Credit Restrictions			
Level of Credit		Credit Hours		Level of Credit		Credit Hours	
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		Contact Hrs/Wk				Contact Hrs/Wk	
		Number of Wks				Number of Wks	
						3 3	
						14	
Repeatability (Indi Research, Dir. Study, Dissertation): Is this course repeatable? <input type="radio"/> Yes <input checked="" type="radio"/> No Max Hours? Max Times? Can it be repeated in the same term? <input type="radio"/> Yes <input checked="" type="radio"/> No							
Class Type(s)		Grading		Location		Cognizant Faculty Member:	
<input checked="" type="checkbox"/> Lec <input type="checkbox"/> Sem <input type="checkbox"/> Dis <input type="checkbox"/> Other <input type="checkbox"/> Rec <input type="checkbox"/> Lab <input type="checkbox"/> Ind		<input checked="" type="checkbox"/> A-E <input type="checkbox"/> CR/NC <input type="checkbox"/> P/F <input type="checkbox"/> S/U		<input checked="" type="checkbox"/> Ann Arbor <input type="checkbox"/> Biological Station <input type="checkbox"/> Camp Davis <input type="checkbox"/> Extension		Title	
Graded Section		Course Is Y Graded <input type="checkbox"/>				David Sept Associate Professor	
<input checked="" type="checkbox"/> Lec <input type="checkbox"/> Sem <input type="checkbox"/> Dis <input type="checkbox"/> Other <input type="checkbox"/> Rec <input type="checkbox"/> Lab <input type="checkbox"/> Ind						Grad Course: Attach nomination if Cognizant Faculty is not a regular graduate faculty	
Approval Info		Approved by Name		Approved Date		Submitted By: <input checked="" type="checkbox"/> Home Dept. <input type="checkbox"/> Cross-listed Dept.	
<input type="checkbox"/> Curriculum Comm.							
<input type="checkbox"/> Faculty						Department Chair Name	
<input type="checkbox"/> Cross listed Unit 1						Chair Signature	
<input type="checkbox"/> Cross listed Unit 2						Home Dept. BiomedE Douglas Noll	
						Cross-listed Dept(s)	

SUPPORTING STATEMENT

The need for this course has been apparent for quite some time. BiomedE graduate students were consistently put on wait list status for courses in the Statistics Department, and when students were enrolled in graduate level Statistics courses they were unable to perform at their expected high level due to an inadequate background in undergraduate level Statistics.

The objective of this course is to make statistics interesting, practical, and user-friendly without getting bogged down in detailed mathematical proofs. Our treatment will still be mathematically rigorous, but the emphasis will be on application and a broader understanding of statistical methods. Students will be introduced to descriptive statistics, probability theory, distributions for discrete and continuous variables, hypothesis testing, and analysis of variance, as well as several advanced topics such as nonparameter tests and Bayesian methods. As often as possible, we will make connections with real problems from engineering, biology, and medicine. Computational tools, primarily R, will be used for examples and assignments. This is a graduate level course and will be taught at a relatively fast pace. Prior coursework in statistics is beneficial, but is not a prerequisite.

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

Detail the Special requirements

BME 599.009: Statistical Methods for Biomedical Engineering
Tuesday/Thursday 1-2:30, 133 Chrysler

Instructor: David Sept, dsept@umich.edu, 615-9587, 2130 LBME

The objective of this course is to make statistics interesting, practical and user-friendly without getting bogged down in detailed mathematical proofs. Our treatment will still be mathematically rigorous, but the emphasis will be on applications and a larger understanding of statistical methods. Students will be introduced to descriptive statistics, probability theory, distributions for discrete and continuous variables, hypothesis testing, and analysis of variance, as well as several advanced topics such as nonparametric tests and Bayesian methods. As often as possible, we will make connections with real problems from engineering, biology and medicine. Computational tools, primarily R, will be used for examples and assignments. This is a graduate level course and will be taught at a relatively fast pace. Prior coursework in statistics will be beneficial, but is not a prerequisite.

This is the first time this course is being taught, so the order of topics may be changed during the course. Below is an initial plan of topics and material.

Week	Topic
1	Descriptive Statistics, Graphing Methods, Introduction to R
2	Data Relationships, Correlation and Regression
3	Probability and Randomness
4	Sampling Distributions
5	Inference and Hypothesis Testing - MIDTERM #1 (Feb 3)
6	Point and Interval Estimation
7	Two-Way Tables, Chi Square, Goodness of Fit
8	Inference for Regression, Multiple Regression
9	Analysis of Variance - MIDTERM #2 (Mar 15)
10	Design of Experiments, Power Analysis
11	Bayesian Estimation and Inference
12	Non-linear Regression, Non-parametric Tests
13	Jackknife and Bootstrap Methods
14	Review, Choosing the Proper Statistical Test

The first 9-10 weeks of the course will present standard methods for analyzing single and multiples variables, confidence intervals, significance testing, etc. The remainder of the course will deal with more specialized (in some sense “advanced”) topics. *If there are topics of particular interest and/or relevance that you would like to see discussed please let me know and I will try to include them.* My goal with this course is to make is useful and practical, so your input and suggestions are always welcome.

Grading: Assignments 40%
Exams (2 midterms + final) 20% each

Homework:

Homework will be assigned on a weekly basis and you should expect about 10 homework assignments for the entire course. These assignments are the best way for you to learn these statistical methods and I am weighting them fairly heavily (40% of your grade). I strongly encourage you to use R to complete your assignments. This is a freely available statistical package that you will find very useful in all your other research and courses. I want assignments printed out and hardcopies handed in to me during class.

Books:

The primary text for the course will be *Introduction to the Practice of Statistics* (7th edition, 2010) by Moore, McCabe and Craig. Earlier editions of this book should also be suitable, but since this is the primary source for homework problems I will transcribe the assigned problems in full so there is no confusion.

As secondary references, you may consider texts on using R. Apart from physical books, there are many, many on-line references and user lists that can help you with specific items in the R package.

Honor Policy:

All students in the class are presumed to be decent and honorable, and all students in the class are bound by the College of Engineering Honor Code. You may not seek to gain an unfair advantage over your fellow students; you may not consult, look at, or possess the unpublished work of another without their permission; and you must appropriately acknowledge your use of another's work. You may discuss your homework assignments with your fellow students at the conceptual level, but must complete all calculations and write-up, from scrap to final form, on your own. Verbatim copying of another student's work is forbidden. You may not consult homework solutions from a previous term unless they are made available in a publicly accessible form (no unfair advantage can be sought). Any violation of the honor policies appropriate to each piece of course work will be reported to the Honor Council, and if guilt is established penalties may be imposed by the Honor Council and Faculty Committee on Discipline. Such penalties can include, but are not limited to, letter grade deductions or expulsion from the University. If you have any questions about this course policy, please consult the course instructor.

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

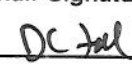
Date 10/19/2011

Effective Term Winter 2012

Course Offer Freq ☒ Indefinitely
☐ One term only

A. CURRENT LISTING

B. REQUESTED LISTING

Home Department		Course Number		Home Department		Course Number	
Cross Listed Course Information		Cross Listed Course Information		BIOMEDE Biomedical Engineering		574	
Course Title		Course Title		Cells in Their Environment			
TITLE ABBRE- VIATION	Time Sched Max = 19 Spaces	Transcript Max = 20 Spaces		TITLE ABBRE- VIATION	Time Sched Max = 19 Spaces	Transcript Max = 20 Spaces	
						Cells in Their Envi	
						Cells inTheir Envir	
Course Description				Course Description for Official Publication (Max = 50 words) This course focuses on how mammalian cells interact with the complex 3D environment that surrounds them in tissues. The goal is to provide students with a thorough understanding of how cell function is controlled, and how this knowledge can be applied to the prevention and treatment of disease.			
PROGRAM OUTCOMES: <input type="checkbox"/> a <input type="checkbox"/> c <input type="checkbox"/> e <input type="checkbox"/> g <input type="checkbox"/> i <input type="checkbox"/> k <input type="checkbox"/> b <input type="checkbox"/> d <input type="checkbox"/> f <input type="checkbox"/> h <input type="checkbox"/> j		PROGRAM OUTCOMES: <input checked="" type="checkbox"/> a <input type="checkbox"/> c <input type="checkbox"/> e <input type="checkbox"/> g <input checked="" type="checkbox"/> i <input type="checkbox"/> k <input type="checkbox"/> b <input checked="" type="checkbox"/> d <input type="checkbox"/> f <input type="checkbox"/> h <input checked="" type="checkbox"/> j		Degree Requirements <input type="radio"/> Degree Requirement <input type="radio"/> Free Elective <input type="radio"/> Other <input type="radio"/> Core Course <input type="radio"/> Tech Elective		Degree Requirements <input type="radio"/> Degree Requirement <input type="radio"/> Free Elective <input type="radio"/> Other <input type="radio"/> Core Course <input checked="" type="radio"/> Tech Elective	
Prereq <input type="radio"/> Enforced <input type="radio"/> Advised				Prereq Graduate student standing or permission of instructor <input type="radio"/> Enforced <input checked="" type="radio"/> Advised			
Credit Restrictions				Credit Restrictions			
Level of Credit <input type="checkbox"/> Undergrad only <input type="checkbox"/> Ugrad or Rackhm Grad <input type="checkbox"/> Rackham Grad <input type="checkbox"/> Ugrad or Non-Rckhm Grad <input type="checkbox"/> Non-Rckhm Grad <input type="checkbox"/> All Credit types		Credit Hours Min Max Contact Hrs/Wk Number of Wks		Level of Credit <input type="checkbox"/> Undergrad only <input checked="" type="checkbox"/> Ugrad or Rackhm Grad <input type="checkbox"/> Rackham Grad <input checked="" type="checkbox"/> Ugrad or Non-Rckhm Grad <input type="checkbox"/> Non-Rckhm Grad <input type="checkbox"/> All Credit types		Credit Hours Min Max Contact Hrs/Wk Number of Wks	
						3 3 14	
Repeatability (Indi Research, Dir. Study, Dissertation): Is this course repeatable? <input type="radio"/> Yes <input checked="" type="radio"/> No Max Hours? _____ Max Times? _____ Can it be repeated in the same term? <input type="radio"/> Yes <input checked="" type="radio"/> No							
Class Type(s) <input checked="" type="checkbox"/> Lec <input type="checkbox"/> Sem <input type="checkbox"/> Dis <input type="checkbox"/> Other <input type="checkbox"/> Rec <input type="checkbox"/> Lab <input type="checkbox"/> Ind		Grading <input checked="" type="checkbox"/> A-E <input type="checkbox"/> CR/NC <input type="checkbox"/> P/F <input type="checkbox"/> S/U		Location <input checked="" type="checkbox"/> Ann Arbor <input type="checkbox"/> Biological Station <input type="checkbox"/> Camp Davis <input type="checkbox"/> Extension		Cognizant Faculty Member: Jan Stegemann Rachael Schmedlen	
Graded Section <input checked="" type="checkbox"/> Lec <input type="checkbox"/> Sem <input type="checkbox"/> Dis <input type="checkbox"/> Other <input type="checkbox"/> Rec <input type="checkbox"/> Lab <input type="checkbox"/> Ind		Course Is Y Graded <input type="checkbox"/>		Title Associate Professor Lecturer		Grad Course: Attach nomination if Cognizant Faculty is not a regular graduate faculty	
Approval Info <input type="checkbox"/> Curriculum Comm. <input type="checkbox"/> Faculty <input type="checkbox"/> Cross listed Unit 1 <input type="checkbox"/> Cross listed Unit 2		Approved by Name _____ _____ _____		Approved Date _____ _____ _____		Submitted By: <input checked="" type="checkbox"/> Home Dept. <input type="checkbox"/> Cross-listed Dept. Department Chair Name Home Dept. BiomedE Douglas Noll Cross-listed Dept(s) _____	
						Chair Signature 	

SUPPORTING STATEMENT

This is a beginning graduate level course for students in the biomedical engineering program, or in other disciplines that provide the required background. The course can be taken as a follow-on from BiomedE 474, Introduction to Tissue Engineering, for those students particularly interested in cell-extracellular cell-matrix interactions. It is designed such that graduate students from a variety of backgrounds can both benefit and contribute from the class. There is sufficient demand in the graduate student population to offer this class every second winter semester. It has been offered twice previously in WI09 and WI10, and received very good ratings on "Q1: Overall this was an excellent course" (WI09: 4.72; WI10: 4.80).

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

Detail the Special requirements

Cells in their Environment

SYLLABUS – Winter 2010

Instructor: Dr. Jan Stegemann
Dept. of Biomedical Engineering
LBME 2146
Tel: 764-8313
jpsteg@umich.edu

Lectures: Tuesdays and Thursdays from 11:00 - 12:30 in LBME 1123

Office Hours: Tuesdays and Thursdays from 12:30-2:00 pm (i.e. immediately after class)

Course Description: The goal of this course is to provide students with a thorough understanding of how cell function is controlled, and how this knowledge can be applied to the prevention and treatment of disease. The course focuses on how mammalian cells interact with the complex 3D environment that surrounds them in tissues. Particular emphasis is placed on how cellular behavior is affected by the extracellular matrix (ECM), the complex set of proteins and proteoglycans that forms the structure of all tissues. The course also covers how cell function is influenced by other biochemical and mechanical stimuli under normal and pathological conditions. Main topics include: extracellular matrix structure and function, cell-matrix interactions and cell signaling, mechanics of the ECM, wound healing, ECM pathologies, control of cell function in tissue engineering and regenerative medicine.

Units: 3

Prerequisites: This course is designed for graduate students in biomedical engineering, but also is open to graduate students in other related fields. There are no formal prerequisites, but students should have a rudimentary knowledge of cell biology and protein structure (readings to provide this can be requested from the instructor).

Required Textbook: There is no required textbook for this course, but required readings will be made available. In addition, students may wish to purchase or borrow an introductory biology textbook as a reference. (e.g. Essential Cell Biology by Alberts, Bray, Hopkin, Johnson, Lewis, Raff, Roberts, Walter, or Molecular Biology of the Cell by Alberts, Johnson, Lewis, Raff, Roberts, Walter, or similar texts).

Other required and supplementary reading materials will be handed out in class and will be posted on the course CTools site.

Supplementary Texts: Books on reserve at Duderstadt Library.

Other Resources: Lecture notes.
Course CTools site.
Internet resources.

Learning Objectives:

By the end of the semester, students should have an understanding of:

- cell function as related to interaction with the cellular microenvironment
- the general structure of a variety of tissues
- the specific contribution of major cell types and ECM components to tissue structure
- cell signaling and control of cell function
- specific examples of diseases and conditions associated with cell/ECM dysfunction
- the current state of the art in cell/ECM research and its application

Grading Scheme: This course is taken for letter grade. All assignments and exams will be counted in the final grade, as follows:

Class Participation	10%	(includes attendance, class and web-based participation)
Exam #1	10%	
LBL Presentation	25%	
Exam #2	20%	
Research Paper	15%	
Exam #3	20%	

General Course Policies:

Attendance at lectures is required. Students who must be absent due to religious observances or other personal matters should notify the instructors in advance. Students with disabilities who require special accommodations during classes, laboratories or examinations should contact the Office of Services to Students with Disabilities to ensure that appropriate arrangements are made.

Assignments and examinations will be graded and returned to students as soon as possible after being handed in. Students should check the grading carefully. Any grade appeals must be made within one week of the return of the assignment or exam.

All students in this class are bound by the College of Engineering Honor Code. You may not seek to gain an unfair advantage over your fellow students; you may not consult, look at, or possess the unpublished work of another without their permission; and you must appropriately acknowledge your use of another's work. Any violation of the honor policies appropriate to each piece of course work will be reported to the Honor Council, and if guilt is established penalties may be imposed by the Honor Council and Faculty Committee on Discipline. Such penalties can include, but are not limited to, letter grade deductions or expulsion from the University. Collaboration policies on individual assignments will be described in the assignment handout. If you have any questions about the policies in this course, please consult the course instructor.

Cells in their Environment

Winter 2010 Class Schedule

UPDATED: January 19, 2010

Note: This schedule is subject to change, depending on how fast material is covered, the availability of guest lecturers, etc. Check the course CTools site regularly for announcements about schedule changes and other course information.

Lecture Date	Topic	Comments
Jan 7	NO CLASS	Reading: The ECM & Cell Adhesion (Plopper).
12	Course overview and introduction	
14	Cell Structure and Function	
19	Cell Communication and Tissues	Optional class on cell biology → TBA
21	Molecular Biology, LBL example	
26	Cell-Matrix Interactions, Reading papers	LBL topic choices due
28	EXAM #1	10% of final grade
Feb 2	Collagens	
4	LBL	
9	Other ECM Proteins	
11	LBL	
16	Cell-Matrix Interactions, Cell Signaling	
18	LBL	
23	Inflammation and Fibrosis	
25	"Case Study"	Format and topic to be announced.
Feb 27 - Mar 8	SPRING BREAK	
Mar 9	Wound Healing	Paper topic due.
11	LBL	
16	Review	
18	EXAM #2	20% of final grade
23	Mechanics of the ECM	
25	LBL	
30	ECM Pathology	Research Paper Due (15% of final grade)
Apr 1	LBL	
6	Tissue Engineering	
8	LBL	
13	Recent Advances in ECM Research	
15	LBL	
20	Summary, Review, and Discussion	
		EXAM #3 will be held during scheduled exam period for class.

LBL = Literature-Based Learning

Course Profile: Biomedical Engineering Program

COURSE #: BIOMEDE 574	COURSE TITLE: Cells in their Environment
TERMS OFFERED: Spring	PREREQUISITES: Graduate student standing or permission of instructor.
TEXTBOOK/REQUIRED MATERIAL: There is no required textbook for this course, but required readings will be made available.	COGNIZANT FACULTY: J. Stegemann
INSTRUCTOR(S): J. Stegemann	DATE OF PREPARATION: 3/28/2011
CATALOG DESCRIPTION: This course focuses on how mammalian cells interact with the complex 3D environment that surrounds them in tissues. The goal is to provide students with a thorough understanding of how cell function is controlled, and how this knowledge can be applied to the prevention and treatment of disease.	SCIENCE/DESIGN: 4/0
	COURSE TOPICS: 1. Cell structure and function 2. Cell communication and tissues 3. Collagens 4. Other extracellular matrix proteins 5. Cell-matrix interactions and cell signaling 6. Inflammation, wound healing, and fibrosis 7. Mechanics of the extracellular matrix 8. Extracellular matrix pathologies 9. Tissue engineering and regenerative medicine

COURSE OBJECTIVES*	<p>Links shown in brackets are to the departmental educational objectives.</p> <ol style="list-style-type: none"> 1. Introduce students to the concepts of environmental control of cell function. [1] 2. Teach students important features of cell and tissue structure. [1] 3. Teach students how extracellular matrix proteins contribute to the cellular environment. [2] 4. Educate students about key physiological repair processes and how they impact the cellular environment. [1] 5. Teach students how principles of mechanics apply to the extracellular environment. [2] 6. Provide students with specific knowledge of how cell function is controlled by the cellular environment. [2] 7. Introduce students to important extracellular matrix pathologies. [2] 9. Provide students with examples of how course material can be applied in regenerative medicine. [1]
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COURSE OUTCOMES*	<p>Links shown in brackets are to the course objectives.</p> <ol style="list-style-type: none"> 1. Describe how cellular components interact with the environment to direct cell function. [1, 2, 3] 2. Explain key physiological processes in tissue repair and regeneration [3, 4] 3. Apply principles of mechanics to understanding tissue properties and effects on cell behavior. [2, 5, 6] 4. Discuss a specific example of environmental control of cell function. [1, 3, 6] 5. Explain the relevance of the cellular environment in important diseases. [1, 7, 8] 6. Apply knowledge of the cellular environment to tissue engineering and regenerative medicine strategies. [1, 7, 8]
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**ASSESSMENT
TOOLS**

Links shown in brackets are to the course outcomes.

1. Research paper (1). [1, 4, 5]
2. Group presentation (1). [1-6]
3. Exams (3). [1-6]

Course Approval Request

College Curriculum Committee, 1420 Lurie Engineering Center Building

Form Number

2102

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

Date 10/19/2011

Effective Term Winter 2012

Course Offer Freq ☒ Indefinitely
☐ One term only

A. CURRENT LISTING

B. REQUESTED LISTING

Home Department		Course Number	Home Department		Course Number
			BIOMEDE Biomedical Engineering		594
Cross Listed Course Information			Cross Listed Course Information		
Course Title			Course Title		
			Recent Advances in Polymer Therapeutics		
TITLE ABBRE- VIATION	Time Sched Max = 19 Spaces		TITLE ABBRE- VIATION	Time Sched Max = 19 Spaces	Rec Adv Poly Therap
	Transcript Max = 20 Spaces			Transcript Max = 20 Spaces	Rec Adv Poly Therap
Course Description			Course Description for Official Publication (Max = 50 words)		
			The course will review the basic principles of polymer science and controlled drug delivery. The course will discuss specific examples of biopolymer applications in protein, peptide, nucleic acids, vaccine delivery, and the formulation of nanostructured devices and their application in targeted delivery of therapeutic and imaging agents.		

PROGRAM OUTCOMES:	<input type="checkbox"/> a <input type="checkbox"/> c <input type="checkbox"/> e <input type="checkbox"/> g <input type="checkbox"/> i <input type="checkbox"/> k <input type="checkbox"/> b <input type="checkbox"/> d <input type="checkbox"/> f <input type="checkbox"/> h <input type="checkbox"/> j	PROGRAM OUTCOMES:	<input checked="" type="checkbox"/> a <input checked="" type="checkbox"/> c <input checked="" type="checkbox"/> e <input checked="" type="checkbox"/> g <input type="checkbox"/> i <input checked="" type="checkbox"/> k <input checked="" type="checkbox"/> b <input checked="" type="checkbox"/> d <input checked="" type="checkbox"/> f <input checked="" type="checkbox"/> h <input checked="" type="checkbox"/> j
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Degree Requirements	<input type="radio"/> Degree Requirement <input type="radio"/> Free Elective <input type="radio"/> Other <input type="radio"/> Core Course <input type="radio"/> Tech Elective	Degree Requirements	<input type="radio"/> Degree Requirement <input type="radio"/> Free Elective <input type="radio"/> Other <input type="radio"/> Core Course <input checked="" type="radio"/> Tech Elective
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Prereq	<input type="radio"/> Enforced <input type="radio"/> Advised	Prereq	BME 410, senior standing, or permission of instructor <input type="radio"/> Enforced <input checked="" type="radio"/> Advised
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Credit Restrictions		Credit Restrictions	
Level of Credit	<input type="checkbox"/> Undergrad only <input type="checkbox"/> Ugrad or Rckhm Grad <input type="checkbox"/> R <input type="checkbox"/> Rackham Grad <input type="checkbox"/> Ugrad or Non-Rckhm Grad <input type="checkbox"/> Non-Rckhm Grad <input type="checkbox"/> All Credit types	Level of Credit	<input type="checkbox"/> Undergrad only <input checked="" type="checkbox"/> Ugrad or Rckhm Grad <input type="checkbox"/> I <input type="checkbox"/> Rackham Grad <input type="checkbox"/> Ugrad or Non-Rckhm Grad <input type="checkbox"/> Non-Rckhm Grad <input type="checkbox"/> All Credit types
Credit Hours	Min Max	Credit Hours	Min Max
			3 3
Contact Hrs/Wk	Number of Wks	Contact Hrs/Wk	Number of Wks
			3 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

Class Type(s)	<input checked="" type="checkbox"/> Lec <input type="checkbox"/> Sem <input type="checkbox"/> Dis <input type="checkbox"/> Other <input type="checkbox"/> Rec <input type="checkbox"/> Lab <input type="checkbox"/> Ind	Grading	<input checked="" type="checkbox"/> A-E <input type="checkbox"/> CR/NC <input type="checkbox"/> P/F <input type="checkbox"/> S/U	Location	<input checked="" type="checkbox"/> Ann Arbor <input type="checkbox"/> Biological Station <input type="checkbox"/> Camp Davis <input type="checkbox"/> Extension	Cognizant Faculty Member:	Title
Graded Section	<input checked="" type="checkbox"/> Lec <input type="checkbox"/> Sem <input type="checkbox"/> Dis <input type="checkbox"/> Other <input type="checkbox"/> Rec <input type="checkbox"/> Lab <input type="checkbox"/> Ind					Mohamed E. H. El-Sayed	Assistant Professor
Course Is Y Graded <input type="checkbox"/>				Grad Course: Attach nomination if Cognizant Faculty is not a regular graduate faculty			

Approval Info	Approved by Name	Approved Date	Submitted By: <input checked="" type="checkbox"/> Home Dept. <input type="checkbox"/> Cross-listed Dept.
<input type="checkbox"/> Curriculum Comm.			
<input type="checkbox"/> Faculty			
<input type="checkbox"/> Cross listed Unit 1			
<input type="checkbox"/> Cross listed Unit 2			
Department Chair Name		Chair Signature	
Home Dept. BiomedE Douglas Noll		D. Noll	
Cross-listed Dept(s)			

SUPPORTING STATEMENT

This course is designed for SGUS and graduate students in the biomedical engineering program. It fulfills the consistent need for a course that discusses the potential applications of biomaterials at the interface of engineering, materials sciences, biology, and medicine, which is a critical and expanding subfield of biomedical engineering. It has been offered in its current format once in Fall 2010 and received very good ratings on "Q1-Overall this was an excellent course: 4.21."

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

Detail the Special requirements

BME 599.003: Recent Advances in Polymer Therapeutics

Fall 2010

I. Course Logistics:

Days/Times: Tuesday & Thursday 3:00 - 4:30 PM

Location: 1123 LBME

Instructor: **Mohamed E.H. El-Sayed, Ph.D.**

Dept. Biomedical Engineering

Office: 2150 LBME

Office Hours: By appointment (schedule by e-mail)

Phone: (734) 615-9404

E-mail: melsayed@umich.edu

II. Course Description:

This course focuses on understanding the central role of polymeric biomaterials in the development of new therapeutic and diagnostic tools that can be used for detection, imaging, and treatment of different life-threatening diseases. The course will review the basic principles of polymer science and controlled drug delivery. Based on this foundation, the course will discuss specific examples of biopolymer applications in protein, peptide, nucleic acids, and vaccine delivery. The course will discuss formulation of nanostructured devices and their application in targeted delivery of therapeutic and imaging agents. Further, the course will discuss the interactions of biopolymers with live mammalian cells at the cellular and molecular levels to understand the parameters that govern polymer's fate *in vivo*. The class will rely on interactive discussion supported by multiple examples from relevant literature. This course is designed for SGUS and graduate students in biomedical engineering and open to graduate students in other related fields.

III. Instructional Materials:

Articles and slides pertaining to each lecture will be posted on CTools (in the Resources folder). No hard copies of material will be brought to class. It is your responsibility to download files and print out lecture notes. It is expected that students will have read the articles prior to class. Suggested References for this course are:

- R. Satchi-Fainaro and R. Duncan, Polymer Therapeutics I, Advances in Polymer Science Series, Springer, New York, NY 10013, 2006.
- R. Satchi-Fainaro and R. Duncan, Polymer Therapeutics II, Advances in Polymer Science Series, Springer, New York, NY 10013, 2006.

IV. Course Goals:

At the conclusion of this course students should be able to:

1. Assess the influence of advanced drug delivery technologies on optimization of drug therapy.
2. Distinguish the temporal and spatial control on drug delivery.
3. Comprehend fundamentals of polymer science.
4. Distinguish the structure-properties relationships of synthetic and natural macromolecules.
5. Apply knowledge of polymer science to the design and evaluation of new drug delivery systems.
6. Distinguish the interactions of polymers with the biological environment.

7. Deduce the influence of the biological fate of polymeric carriers on controlled drug delivery.
8. Identify important factors responsible for the successful design of targetable drug carriers.
10. Compare and contrast various technologies utilized for feedback-controlled drug delivery.
11. Summarize the basic constructs used in stimuli-sensitive polymeric drug delivery systems.
12. Identify the major components of non-viral gene and oligonucleotide drug delivery systems.
13. Critique research related to polymeric controlled drug delivery.

V. Course Requirements/Grading:

This course is taken for letter grade. All assignments and exams will be counted in the final grade, as follows:

Midterm Exam	35%
Final Exam	35%
Grant Proposal	15%
Student Presentation	15%

VI. Idea/Grant Proposal:

Students will be divided into teams of two where each team will come up with a new research idea to address a problem in biology or medicine using a biopolymer. Each team will describe this idea in a 2-page proposal that covers i) the rationale and motivation of this research, ii) proposed idea, the supporting hypothesis, and specific aims of the research, iii) experimental strategy to test your hypotheses, and iv) anticipated results. The grade for this assignment will be based on the novelty of the proposed idea, coherence of the proposed research plan, and the quality of the proposal in terms of organization, grammar, and proper citation of relevant work. Each team will choose a topic from the following list to be the focus of the research proposal/idea. **The selected topic must be different than a student's dissertation project.** I will be available to assist you to choose a topic. The following is a suggested list of topics (you do not have to limit yourself to these topics, creative ideas are welcome). **Selected topics are due by each team by November 16 no later than 5:00 PM.**

1. Biocompatibility of biopolymers
3. Polymers for site-specific drug delivery to the GI tract
4. Endocytosis and subcellular trafficking of macromolecules
5. Polymers for targeted drug delivery
6. Microspheres and nanoparticles for drug delivery
7. PEGylation (derivatization with polyethylene glycol) in controlled drug delivery
8. Hydrogels in drug delivery
9. Stimuli-sensitive polymers for drug delivery
10. Photodynamic therapy
11. Vaccine delivery
12. 13. Gene Delivery
14. Novel biomaterials for drug delivery
15. Polymers and drug resistance
16. Polymer genomics

VII. Student Presentation:

Each team will present its idea with emphasis on the research problem, proposed solution and supporting hypothesis, aims and the associated experimental plan, and anticipated results. Each presentation should be limited to 12-15 minutes with 5-8 minutes for Q&A.

VIII. General Course Policies:

Attendance at lectures is required. Students who must be absent due to religious observances or other personal matters should notify the instructors in advance. Students with disabilities who require special accommodations during classes or examinations should contact the Office of Services to Students with Disabilities to ensure that appropriate arrangements are made.

Assignments and examinations will be graded and returned to students as soon as possible after being handed in. Students should check the grading carefully. Any grade appeals must be made within one week of the return of the assignment or exam.

All students in this class are bound by the College of Engineering Honor Code. You may not seek to gain an unfair advantage over your fellow students; you may not consult, look at, or possess the unpublished work of another without their permission; and you must appropriately acknowledge your use of another's work. Any violation of the honor policies appropriate to each piece of course work will be reported to the Honor Council, and if guilt is established penalties may be imposed by the Honor Council and Faculty Committee on Discipline. Such penalties can include, but are not limited to, letter grade deductions or expulsion from the University. Collaboration policies on individual assignments will be described in the assignment handout. If you have any questions about the policies in this course, please consult the course instructor.

IX. Lecture Schedule:

This is a tentative description of the topics covered in this course. They can be modified/changed based on course progress.

September 14	Course logistics & Introduction to Polymer Therapeutics
September 16	Soluble polymers as targetable drug carriers
September 21	Oral absorption of polymeric drug delivery systems (PDDS)
September 23	Hydrogels/site-specific drug delivery to the GI tract
September 28	Dendrimers as a special carrier for therapeutic/diagnostic drugs
September 30	Domino Dendrimers
October 5	Overview of synthesis strategies of biopolymers (Dr. Durmaz)
October 7	Overview of characterization methods of biopolymers (Dr. Durmaz)
October 12	Gene delivery using polymeric carriers (I)
October 14	Gene delivery using polymeric carriers (II)
October 19	Fall Break-No Class
October 21	Exam I (35%)
October 26	PDDS for cancer therapy (EPR; Passive and Active Targeting)
October 28	PK/PD advantages of polymer-drug conjugates in cancer therapy
November 2	Targeting tumor angiogenesis using PDDS
November 4	Combination therapy using PDDS
November 9	Self-assembled nanostructured devices for drug delivery (I)
November 11	Self-assembled nanostructured devices for drug delivery (II)
November 16	Polymer genomics (I) – Proposal topics are due by 5:00 PM
November 18	Polymer genomics (II)
November 23	Applications of PDDS in diagnostic imaging (I)
November 25	Thanksgiving Holiday-No Class
November 30	Applications of PDDS in diagnostic imaging (II)
December 2	Student Presentation
December 7	Student Presentation
December 9	Student Presentation
December 16	Final Exam (35%)

Course Profile: Biomedical Engineering Program

COURSE #: BIOMEDE 599.003	
TERMS OFFERED: Fall	
TEXTBOOK/REQUIRED MATERIAL: There is no required textbook for this course, but required readings will be made available.	COURSE TITLE: Recent Advances in Polymer Therapeutics
INSTRUCTOR(S): M. El-Sayed	PREREQUISITES: BME 410, senior standing or permission of instructor
CATALOG DESCRIPTION: This course focuses on understanding the central role of polymeric biomaterials in the development of new therapeutic and diagnostic tools that can be used for detection, imaging, and treatment of different life-threatening diseases. The course will review the basic principles of polymer science and controlled drug delivery. Based on this foundation, the course will discuss specific examples of biopolymer applications in protein, peptide, nucleic acids, and vaccine delivery. The course will discuss formulation of nanostructured devices and their application in targeted delivery of therapeutic and imaging agents. Further, the course will discuss the interactions of biopolymers with live mammalian cells at the cellular and molecular levels to understand the parameters that govern polymer's fate <i>in vivo</i> . The class will rely on interactive discussion supported by multiple examples from relevant literature.	COGNIZANT FACULTY: M. El-Sayed DATE OF PREPARATION: 4/27/2011 SCIENCE/DESIGN: 3/0
	COURSE TOPICS: 1. Soluble polymers as targetable drug carriers 2. Oral absorption of polymeric drug delivery systems 3. Hydrogels/site-specific drug delivery to the GI tract 4. Dendrimers as a special carrier for therapeutic/diagnostic drugs 5. Synthesis & characterization of biopolymers 6. Gene delivery using polymeric carriers 7. Polymeric drug delivery systems for cancer therapy 8. PK/PD advantages of polymer-drug conjugates in cancer therapy 9. Self-assembled nanostructured devices for drug delivery 10. Polymer genomics 11. Applications of polymeric drug delivery systems in diagnostic imaging

COURSE OBJECTIVES*	<p>Links shown in brackets are to the departmental educational objectives.</p> <ol style="list-style-type: none"> 1. Introduce students to the principles of the field of drug delivery and polymer therapeutics. [1, 2, 3] 2. Teach students key aspects of biomaterials science as applied to drug delivery, imaging, and therapy. [1, 2, 3] 3. Teach students important concepts about spatial and temporal control over drug delivery. [1, 2, 3] 4. Introduce students to underlying concepts of structure-property relationship for natural and synthetic macromolecules. [1, 2, 3] 5. Teach students principles governing biomaterial interaction with the biological environment and how it influences material's fate. [1, 2, 3] 6. Provide students with specific knowledge of how therapeutic and imaging systems can be designed and formulated using optimum biomaterials. [1, 2, 3] 7. Educate students on the various technologies utilized for feedback-controlled drug delivery systems. [1, 2, 3] 8. Provide students with knowledge of stimuli-sensitive polymeric drug delivery systems. [1, 2, 3] 9. Provide students with an understanding of the current state of the drug delivery and nanotechnology industry. [1, 2, 3]
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COURSE OUTCOMES*	<p>Links shown in brackets are to the course objectives.</p> <ol style="list-style-type: none"> 1. Describe the principles of material design and their structure-property relationship. [1, 2, 3, 5, 10, 12, 13] 2. Explain key physiological processes governing spatial and temporal control over drug delivery. [1, 2, 3, 5, 10, 12, 13] 3. Understand principles governing biomaterial interaction with the biological environment. [1, 2, 3, 5, 10, 12, 13] 4. Apply the principles of materials design and their interaction with biological environment to develop novel therapeutic and imaging systems. [1, 2, 3, 5, 10, 12, 13] 5. Discuss current concepts in targeted drug delivery and nanomedicine. [1, 2, 3, 5, 10, 12, 13] 7. Describe generally the size, structure, and main drivers in the current nanotechnology and nanomedicine industry. [1, 2, 3, 5, 10, 12, 13]
ASSESSMENT TOOLS	<p>Links shown in brackets are to the course outcomes.</p> <ol style="list-style-type: none"> 1. Exams (2). [1-3, 5-7, 13] 2. Grant proposal [1-7, 10-13] 3. Oral presentation [1-7, 10-13]

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

Date 11/2/2011

Effective Term Winter 2012

Course Offer Freq

- ☒ Indefinitely
☐ One term only

A. CURRENT LISTING

B. REQUESTED LISTING

Home Department		Course Number		Home Department		Course Number	
ENGR Engineering		290		ENGR Engineering		290	
Cross Listed Course Information				Cross Listed Course Information			
Course Title				Course Title			
Special Topics in Engineering				Special Topics in Engineering			
TITLE ABBRE- VIATION	Time Sched Max = 19 Spaces			TITLE ABBRE- VIATION	Time Sched Max = 19 Spaces	Spec Topics in Engr	
Transcript Max = 20 Spaces				Transcript Max = 20 Spaces			
Course Description				Course Description for Official Publication (Max = 50 words)			
Place holder course for special topics. Description of 200-level content and credit hours at the discretion of the instructor.							
PROGRAM OUTCOMES:		<input type="checkbox"/> a <input type="checkbox"/> c <input type="checkbox"/> e <input type="checkbox"/> g <input type="checkbox"/> i <input type="checkbox"/> k <input type="checkbox"/> b <input type="checkbox"/> d <input type="checkbox"/> f <input type="checkbox"/> h <input type="checkbox"/> j		PROGRAM OUTCOMES:		<input type="checkbox"/> a <input type="checkbox"/> c <input type="checkbox"/> e <input type="checkbox"/> g <input type="checkbox"/> i <input type="checkbox"/> k <input type="checkbox"/> b <input type="checkbox"/> d <input type="checkbox"/> f <input type="checkbox"/> h <input type="checkbox"/> j	
Degree Requirements		<input type="radio"/> Degree Requirement <input type="radio"/> Free Elective <input type="radio"/> Other <input type="radio"/> Core Course <input type="radio"/> Tech Elective		Degree Requirements		<input type="radio"/> Degree Requirement <input type="radio"/> Free Elective <input checked="" type="radio"/> Other <input type="radio"/> Core Course <input type="radio"/> Tech Elective	
Prereq				Prereq			
<input type="radio"/> Enforced <input type="radio"/> Advised				<input type="radio"/> Enforced <input type="radio"/> Advised			
Credit Restrictions				Credit Restrictions			
Level of Credit		Credit Hours		Level of Credit		Credit Hours	
<input type="checkbox"/> Undergrad only <input type="checkbox"/> Ugrad or Non-Rckhm Grad <input type="checkbox"/> Rackham Grad <input type="checkbox"/> All Credit types <input type="checkbox"/> Non-Rckhm Grad <input type="checkbox"/> Rckhm Grad w/add'l Work <input type="checkbox"/> Ugrad or Rckhm Grad		Min Max		<input checked="" type="checkbox"/> Undergrad only <input type="checkbox"/> Ugrad or Non-Rckhm Grad <input type="checkbox"/> Rackham Grad <input type="checkbox"/> All Credit types <input type="checkbox"/> Non-Rckhm Grad <input type="checkbox"/> Rckhm Grad w/add'l Work <input type="checkbox"/> Ugrad or Rckhm Grad		Min Max	
		Contact Hrs/Wk				Contact Hrs/Wk	
		Number of Wks				Number of Wks	
						14	

Repeatability (Indi Research, Dir. Study, Dissertation: Is this course repeatable? ☒ Yes ☐ No Max Hours? 8 Max Times? 4 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

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

Course Is Y Graded ☐

Cognizant Faculty Member: Lorelle Meadows Title _____

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

Approval Info	Approved by Name	Approved Date	Submitted By: <input checked="" type="checkbox"/> Home Dept. <input type="checkbox"/> Cross-listed Dept.
<input type="checkbox"/> Curriculum Comm.			
<input type="checkbox"/> Faculty			Department Chair Name <u>L. Meadows</u> Chair Signature <u>[Signature]</u>
<input type="checkbox"/> Cross listed Unit 1			Home Dept. _____
<input type="checkbox"/> Cross listed Unit 2			Cross-listed Dept(s). _____

Form Number

2264

SUPPORTING STATEMENT

To provide consistency between Special Topics in Engineering Courses across the 100-400 levels

Are any special resources or facilities required for this course?

☐ Yes ☐ No

Detail the Special requirements

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

Date 11/2/2011

Effective Term Winter 2012

Course Offer Freq ☒ Indefinitely
☐ One term only

A. CURRENT LISTING

B. REQUESTED LISTING

Home Department		Course Number	Home Department		Course Number
ENGR Engineering		390	ENGR Engineering		390
Cross Listed Course Information			Cross Listed Course Information		
Course Title			Course Title		
Special Topics			Special Topics in Engineering		
TITLE ABBREVIATION	Time Sched Max = 19 Spaces	Spec Topics in Engr	TITLE ABBREVIATION	Time Sched Max = 19 Spaces	Spec Topics in Engr
	Transcript Max = 20 Spaces			Transcript Max = 20 Spaces	
Course Description			Course Description for Official Publication (Max = 50 words)		
Spec Topics in Engr			Place holder course for special topics. Description of 300-level content and credit hours at the discretion of the instructor.		
PROGRAM OUTCOMES:		<input type="checkbox"/> a <input type="checkbox"/> c <input type="checkbox"/> e <input type="checkbox"/> g <input type="checkbox"/> i <input type="checkbox"/> k <input type="checkbox"/> b <input type="checkbox"/> d <input type="checkbox"/> f <input type="checkbox"/> h <input type="checkbox"/> j	PROGRAM OUTCOMES:		<input type="checkbox"/> a <input type="checkbox"/> c <input type="checkbox"/> e <input type="checkbox"/> g <input type="checkbox"/> i <input type="checkbox"/> k <input type="checkbox"/> b <input type="checkbox"/> d <input type="checkbox"/> f <input type="checkbox"/> h <input type="checkbox"/> j
Degree Requirements		<input type="radio"/> Degree Requirement <input type="radio"/> Free Elective <input type="radio"/> Other <input type="radio"/> Core Course <input type="radio"/> Tech Elective	Degree Requirements		<input type="radio"/> Degree Requirement <input type="radio"/> Free Elective <input checked="" type="radio"/> Other <input type="radio"/> Core Course <input type="radio"/> Tech Elective
Prereq		<input type="radio"/> Enforced <input type="radio"/> Advised	Prereq		<input type="radio"/> Enforced <input type="radio"/> Advised
Credit Restrictions			Credit Restrictions		
Level of Credit		Credit Hours	Level of Credit		Credit Hours
<input type="checkbox"/> Undergrad only <input type="checkbox"/> Rackham Grad <input type="checkbox"/> Non-Rckhm Grad <input type="checkbox"/> Ugrad or Rckhm Grad	<input type="checkbox"/> Ugrad or Non-Rckhm Grad <input type="checkbox"/> All Credit types <input type="checkbox"/> Rckhm Grad w/add'l Work	Min Max	<input type="checkbox"/> Undergrad only <input type="checkbox"/> Rackham Grad <input type="checkbox"/> Non-Rckhm Grad <input type="checkbox"/> Ugrad or Rckhm Grad	<input type="checkbox"/> Ugrad or Non-Rckhm Grad <input type="checkbox"/> All Credit types <input type="checkbox"/> Rckhm Grad w/add'l Work	Min Max
		Contact Hrs/Wk			Contact Hrs/Wk
		Number of Wks			Number of Wks

Repeatability (Indi Research, Dir. Study, Dissertation: Is this course repeatable? ☒ Yes ☐ No Max Hours? 8 Max Times? 4 Can it be repeated in the same term? ☒ Yes ☐ No

C.

Class Type(s)		Grading	Location	Cognizant Faculty Member: Title	
<input checked="" type="checkbox"/> Lec <input type="checkbox"/> Sem <input type="checkbox"/> Dis <input type="checkbox"/> Other	<input checked="" type="checkbox"/> A-E <input type="checkbox"/> CR/NC <input type="checkbox"/> P/F <input type="checkbox"/> S/U	<input checked="" type="checkbox"/> Ann Arbor <input type="checkbox"/> Biological Station <input type="checkbox"/> Camp Davis <input type="checkbox"/> Extension			
Graded Section		Grad Course: Attach nomination if Cognizant Faculty is not a regular graduate faculty			
<input checked="" type="checkbox"/> Lec <input type="checkbox"/> Sem <input type="checkbox"/> Dis <input type="checkbox"/> Other	Course Is Y Graded <input type="checkbox"/>				
Approval Info		Approved by Name	Approved Date	Submitted By: <input checked="" type="checkbox"/> Home Dept. <input type="checkbox"/> Cross-listed Dept.	
<input type="checkbox"/> Curriculum Comm.					
<input type="checkbox"/> Faculty					
<input type="checkbox"/> Cross listed Unit 1					
<input type="checkbox"/> Cross listed Unit 2					
		Department	Chair Name	Chair Signature	
		Home Dept.	L. Meadows	<i>[Signature]</i>	
		Cross-listed			
		Dept(s).			

Form Number

2265

SUPPORTING STATEMENT

To provide consistency between Special Topics in Engineering Courses across the 100-400 levels

Are any special resources or facilities required for this course?

☐ Yes ☐ No

Detail the Special requirements

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

Form Number **2257**

Date **10/21/2011**

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

Effective Term **Winter 2012**

Course Offer Freq ☒ Indefinitely
☐ One term only

A. CURRENT LISTING

B. REQUESTED LISTING

Home Department		Course Number		Home Department		Course Number	
Cross Listed Course Information				NERS Nuclear Engin & Radiolog Sci		531	
Course Title				Course Title		Nuclear Waste Management	
TITLE ABBRE- VIATION	Time Sched Max = 19 Spaces Transcript Max = 20 Spaces			TITLE ABBRE- VIATION	Time Sched Max = 19 Spaces Transcript Max = 20 Spaces	Nucl Waste Management	
Course Description				Course Description for Official Publication (Max = 50 words)		Based on the nuclear fuel cycle, this course will review the origin, composition, form and volumes of waste generated by commercial reactors and defense programs. The scientific and engineering basis for near-field and far-field containment in a geological repository will be reviewed in the contest of performance assessment methodologies.	
PROGRAM OUTCOMES: <input type="checkbox"/> a <input type="checkbox"/> c <input type="checkbox"/> e <input type="checkbox"/> g <input type="checkbox"/> i <input type="checkbox"/> k <input type="checkbox"/> b <input type="checkbox"/> d <input type="checkbox"/> f <input type="checkbox"/> h <input type="checkbox"/> j				PROGRAM OUTCOMES: <input type="checkbox"/> a <input type="checkbox"/> c <input type="checkbox"/> e <input type="checkbox"/> g <input type="checkbox"/> i <input type="checkbox"/> k <input type="checkbox"/> b <input type="checkbox"/> d <input type="checkbox"/> f <input type="checkbox"/> h <input type="checkbox"/> j			
Degree Requirements <input type="radio"/> Degree Requirement <input type="radio"/> Free Elective <input type="radio"/> Other <input type="radio"/> Core Course <input type="radio"/> Tech Elective				Degree Requirements <input type="radio"/> Degree Requirement <input type="radio"/> Free Elective <input type="radio"/> Other <input type="radio"/> Core Course <input checked="" type="radio"/> Tech Elective			
Prereq <input type="radio"/> Enforced <input type="radio"/> Advised				Prereq senior standing <input type="radio"/> Enforced <input checked="" type="radio"/> Advised			
Credit Restrictions				Credit Restrictions			
Level of Credit		Credit Hours		Level of Credit		Credit Hours	
<input type="checkbox"/> Undergrad only <input type="checkbox"/> Ugrad or Non-Richm Grad <input type="checkbox"/> Richm Grad <input type="checkbox"/> All Credit types <input type="checkbox"/> Non-Richm Grad <input type="checkbox"/> Richm Grad w/ add'l Work <input checked="" type="checkbox"/> Ugrad or Richm Grad		Min Max 3 3		<input type="checkbox"/> Undergrad only <input type="checkbox"/> Ugrad or Non-Richm Grad <input type="checkbox"/> Richm Grad <input type="checkbox"/> All Credit types <input type="checkbox"/> Non-Richm Grad <input type="checkbox"/> Richm Grad w/ add'l Work <input checked="" type="checkbox"/> Ugrad or Richm Grad		Min Max 3 3	
		Contact Hrs/Wk Number of Wks 3 14				Contact Hrs/Wk Number of Wks 3 14	
Repeatability (Indl Research, Dir. Study, Dissertation: Is this course repeatable?) <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				Max Hours? Max Times? Can it be repeated in the same term? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
Class Type(s) <input checked="" type="checkbox"/> Lec <input type="checkbox"/> Sem <input type="checkbox"/> Dis <input type="checkbox"/> Other <input type="checkbox"/> Rec <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Ind		Grading <input checked="" type="checkbox"/> A-E <input type="checkbox"/> CR/NC <input type="checkbox"/> P/F <input type="checkbox"/> S/U		Location <input checked="" type="checkbox"/> Ann Arbor <input type="checkbox"/> Biological Station <input type="checkbox"/> Camp Davis <input type="checkbox"/> Extension		Cognizant Faculty Member: Title Rod Ewing Professor	
Graded Section <input checked="" type="checkbox"/> Lec <input type="checkbox"/> Sem <input type="checkbox"/> Dis <input type="checkbox"/> Other <input type="checkbox"/> Roc <input type="checkbox"/> Lab <input type="checkbox"/> Ind		Course Is Y Graded <input type="checkbox"/>		Grad Course: Attach nomination if Cognizant Faculty is not a regular graduate faculty			
Approval Info <input type="checkbox"/> Curriculum Comm.		Approved by Name		Approved Date		Submitted By: <input checked="" type="checkbox"/> Home Dept. <input type="checkbox"/> Cross-listed Dept.	
<input type="checkbox"/> Faculty						Department Chair Name Nuclear Engin & Radiolog Sci	
<input type="checkbox"/> Cross listed Unit 1						Chair Signature R. Ewing	
<input type="checkbox"/> Cross listed Unit 2						Cross-listed Dept(s) Earth/Environmental Sci	

SUPPORTING STATEMENT

Dr. Rod Ewing has a joint appointment between NERS and Geological Sciences (now Earth & Environmental Sciences). Dr. Ewing is the cognizant faculty member for this course. This course has been approved by the NERS department for cross-listing with GeoSci (now EES)

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

Detail the Special requirements

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

Form Number **2258**

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

Date **10/21/2011**

Effective Term **Winter 2012**

Course Offer Freq ☒ Indefinitely
☐ One term only

A. CURRENT LISTING

B. REQUESTED LISTING

Home Department		Course Number		Home Department		Course Number	
NERS Nuclear Engin & Radiolog Sci		621		NERS Nuclear Engin & Radiolog Sci		621	
Cross Listed Course Information				Cross Listed Course Information			
				Earth and Environment Sciences Formerly Geological Sciences			
Course Title				Course Title			
				Nuclear Waste Forms			
TITLE	Time Sched			TITLE	Time Sched		
ABRE-	Max = 19 Spaces			ABRE-	Max = 19 Spaces		
VATION	Transcript			VATION	Transcript		
	Max = 20 Spaces				Max = 20 Spaces		
Course Description				Course Description for Official Publication (Max = 50 words)			
				This interdisciplinary course will review the materials science of radioactive waste remediation and disposal strategies. The main focus will be on corrosion mechanisms, radiation effect, and the long-term durability of glasses and crystalline ceramics proposed for the immobilization and disposal of nuclear waste.			
PROGRAM OUTCOMES:				PROGRAM OUTCOMES:			
<input type="checkbox"/> a <input type="checkbox"/> c <input type="checkbox"/> e <input type="checkbox"/> g <input type="checkbox"/> i <input type="checkbox"/> k <input type="checkbox"/> b <input type="checkbox"/> d <input type="checkbox"/> f <input type="checkbox"/> h <input type="checkbox"/> j				<input type="checkbox"/> a <input type="checkbox"/> c <input type="checkbox"/> e <input type="checkbox"/> g <input type="checkbox"/> i <input type="checkbox"/> k <input type="checkbox"/> b <input type="checkbox"/> d <input type="checkbox"/> f <input type="checkbox"/> h <input type="checkbox"/> j			
Degree Requirements				Degree Requirements			
<input type="radio"/> Degree Requirement <input type="radio"/> Free Elective <input type="radio"/> Other <input type="radio"/> Core Course <input type="radio"/> Tech Elective				<input type="radio"/> Degree Requirement <input type="radio"/> Free Elective <input type="radio"/> Other <input type="radio"/> Core Course <input checked="" type="radio"/> Tech Elective			
Prereq				Prereq NERS 531			
<input type="radio"/> Enforced <input type="radio"/> Advised				<input type="radio"/> Enforced <input checked="" type="radio"/> Advised			
Credit Restrictions				Credit Restrictions			
Level of Credit		Credit Hours	Contact Hrs/Wk	Level of Credit		Credit Hours	Contact Hrs/Wk
<input type="checkbox"/> Undergrad only <input type="checkbox"/> Ugrad or Non-Richm Grad <input type="checkbox"/> Richm Grad <input type="checkbox"/> All Credit types <input type="checkbox"/> Non-Richm Grad <input type="checkbox"/> Richm Grad w/ add'l Work <input type="checkbox"/> Ugrad or Richm Grad		Min Max	Number of Wks	<input type="checkbox"/> Undergrad only <input checked="" type="checkbox"/> Ugrad or Non-Richm Grad <input type="checkbox"/> Richm Grad <input type="checkbox"/> All Credit types <input type="checkbox"/> Non-Richm Grad <input type="checkbox"/> Richm Grad w/ add'l Work <input checked="" type="checkbox"/> Ugrad or Richm Grad		Min Max	Number of Wks
						3 3	14
Repeatability (Indl Research, Dir. Study, Dissertation): Is this course repeatable? Yes Max Hours? Max Times? Can it be repeated in the same term? Yes No							
Class Type(s)		Grading	Location	Cognizant Faculty Member:		Title	
<input checked="" type="checkbox"/> Lec <input type="checkbox"/> Sem <input type="checkbox"/> Dis <input type="checkbox"/> Other <input type="checkbox"/> Rec <input type="checkbox"/> Lab <input type="checkbox"/> Ind		<input checked="" type="checkbox"/> A-E <input type="checkbox"/> CR/NC <input type="checkbox"/> P/F <input type="checkbox"/> S/U	<input checked="" type="checkbox"/> Ann Arbor <input type="checkbox"/> Biological Station <input type="checkbox"/> Camp Davis <input type="checkbox"/> Extension	Gary Was		Professor	
Graded Section		Course Is Y Graded <input type="checkbox"/>		Grad Course: Attach nomination if Cognizant Faculty is not a regular graduate faculty			
<input checked="" type="checkbox"/> Lec <input type="checkbox"/> Sem <input type="checkbox"/> Dis <input type="checkbox"/> Other <input type="checkbox"/> Rec <input type="checkbox"/> Lab <input type="checkbox"/> Ind							
Approval Info		Approved by Name	Approved Date	Submitted By:		Chair Signature	
<input type="checkbox"/> Curriculum Comm.				<input type="checkbox"/> Home Dept. <input type="checkbox"/> Cross-listed Dept.			
<input type="checkbox"/> Faculty				Department Chair Name		Chair Signature	
<input type="checkbox"/> Cross listed Unit 1				Home Dept. Nuclear Engin & Radiolog Sci		<i>Ron Gilgenbach</i>	
<input type="checkbox"/> Cross listed Unit 2				Cross-listed Earth/Environmental Sci		<i>Peter...</i>	
				Dept(s).			

2258

Content of NERS 621 is relevant to EES students. Requested by EES to make this a cross-listed course / Approved by the NERS faculty to be cross-listed

This image shows a full page of a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

Detail the Special requirements

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

Form Number **2256**

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

Date **10/21/2011**

Effective Term **Winter 2012**

Course Offer Freq ☒ Indefinitely
☐ One term only

A. CURRENT LISTING

B. REQUESTED LISTING

Home Department		Course Number		Home Department		Course Number	
				NERS Nuclear Engin & Radiolog Sci		490	
Cross Listed Course Information				Cross Listed Course Information			
Course Title				Course Title			
				Special Topics in Nuclear Engr and Radiological Sciences			
TITLE ABBRE- VIATION	Time Sched Max = 19 Spaces			TITLE ABBRE- VIATION	Time Sched Max = 19 Spaces	Spec Topics	
	Transcript Max = 20 Spaces				Transcript Max = 20 Spaces	Spec Topics	
Course Description				Course Description for Official Publication (Max = 50 words)			
				Selected topics offered at the senior or first-year graduate level. The subject matter may change from term to term.			
PROGRAM OUTCOMES:		<input type="checkbox"/> a <input type="checkbox"/> c <input type="checkbox"/> e <input type="checkbox"/> g <input type="checkbox"/> i <input type="checkbox"/> k <input type="checkbox"/> b <input type="checkbox"/> d <input type="checkbox"/> f <input type="checkbox"/> h <input type="checkbox"/> j			PROGRAM OUTCOMES:		<input type="checkbox"/> a <input type="checkbox"/> c <input type="checkbox"/> e <input type="checkbox"/> g <input type="checkbox"/> i <input type="checkbox"/> k <input type="checkbox"/> b <input type="checkbox"/> d <input type="checkbox"/> f <input type="checkbox"/> h <input type="checkbox"/> j
Degree Requirements		<input type="radio"/> Degree Requirement <input type="radio"/> Core Course	<input type="radio"/> Free Elective <input type="radio"/> Tech Elective	Degree Requirements		<input type="radio"/> Degree Requirement <input type="radio"/> Core Course	<input type="radio"/> Free Elective <input checked="" type="radio"/> Tech Elective
Prereq				Prereq permission of instructor			
<input type="radio"/> Enforced <input type="radio"/> Advised				<input checked="" type="radio"/> Enforced <input type="radio"/> Advised			
Credit Restrictions				Credit Restrictions			
Level of Credit		Credit Hours	Contact Hrs/Wk	Level of Credit		Credit Hours	Contact Hrs/Wk
<input type="checkbox"/> Undergrad only <input type="checkbox"/> Rackham Grad <input checked="" type="checkbox"/> Non-Rackham Grad <input type="checkbox"/> Ugrad or Rackham Grad	<input checked="" type="checkbox"/> Ugrad or Non-Rackham Grad <input type="checkbox"/> All Credit types <input type="checkbox"/> Rackham Grad w/add'l Work	Min Max 1 4	variabl Number of Wks 14	<input type="checkbox"/> Undergrad only <input type="checkbox"/> Rackham Grad <input checked="" type="checkbox"/> Non-Rackham Grad <input type="checkbox"/> Ugrad or Rackham Grad	<input checked="" type="checkbox"/> Ugrad or Non-Rackham Grad <input type="checkbox"/> All Credit types <input type="checkbox"/> Rackham Grad w/add'l Work	Min Max 1 4	varia Number of Wks 14
Repeatability (Indi Research, Dir. Study, Dissertation): Is this course repeatable?				Repeatability (Indi Research, Dir. Study, Dissertation): Is this course repeatable?			
<input type="radio"/> Yes <input type="radio"/> No				<input checked="" type="radio"/> Yes <input type="radio"/> No			
Max Hours? 10				Max Times? 3			
Can it be repeated in the same term?				Can it be repeated in the same term?			
<input type="radio"/> Yes <input type="radio"/> No				<input checked="" type="radio"/> Yes <input type="radio"/> No			
Class Type(s)		Grading	Location	Cognizant Faculty Member:		Title	
<input type="checkbox"/> Lec <input type="checkbox"/> Sem <input type="checkbox"/> Dis <input type="checkbox"/> Other	<input type="checkbox"/> A-E <input type="checkbox"/> CR/NC <input type="checkbox"/> P/F <input type="checkbox"/> S/U	<input checked="" type="checkbox"/> Ann Arbor <input type="checkbox"/> Biological Station <input type="checkbox"/> Camp Davis <input type="checkbox"/> Extension					
Graded Section		Course Is Y Graded <input type="checkbox"/>		Grad Course: Attach nomination if Cognizant Faculty is not a regular graduate faculty			
<input type="checkbox"/> Lec <input type="checkbox"/> Sem <input type="checkbox"/> Dis <input type="checkbox"/> Other	<input type="checkbox"/> A-E <input type="checkbox"/> CR/NC <input type="checkbox"/> P/F <input type="checkbox"/> S/U						
<input type="checkbox"/> Rec <input type="checkbox"/> Lab <input type="checkbox"/> Ind							
Approval Info		Approved by Name	Approved Date	Submitted By:		Chair Signature	
<input type="checkbox"/> Curriculum Comm.				<input type="checkbox"/> Home Dept. <input type="checkbox"/> Cross-listed Dept.			
<input type="checkbox"/> Faculty				Department Chair Name		Chair Signature	
<input type="checkbox"/> Cross listed Unit 1				Home Dept. NERS - Ron Gilgenbach		Ron Gilgenbach	
<input type="checkbox"/> Cross listed Unit 2				Cross-listed Dept(s)			

This course is a repeatable course. Topic areas in courses vary from term to term.

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Detail the Special requirements

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

Form Number **2255**

Date **10/21/2011**

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

Effective Term **Winter 2012**

Course Offer Freq ☒ Indefinitely
☐ One term only

A. CURRENT LISTING

B. REQUESTED LISTING

Home Department		Course Number		Home Department		Course Number	
				NERS Nuclear Engin & Radiolog Sci		583	
Cross Listed Course Information				Cross Listed Course Information			
Course Title				Course Title			
				Applied Radiation Dose Assessment			
TITLE ABBRE- VIATION	Time Sched Max = 19 Spaces			TITLE ABBRE- VIATION	Time Sched Max = 19 Spaces	Appl Rad Dose Assess	
	Transcript Max = 20 Spaces				Transcript Max = 20 Spaces	Appl Rad Dos Assess	
Course Description				Course Description for Official Publication (Max = 50 words)			
				Principles and methods of protection against radiation hazards. Occupation, environmental, and medical aspects included. Internal and external dose assessment, dosimetry, health effects, and personnel and patient protection. Special health and medical physics computational techniques and problems.			
PROGRAM OUTCOMES:		<input type="checkbox"/> a <input type="checkbox"/> c <input type="checkbox"/> e <input type="checkbox"/> g <input type="checkbox"/> i <input type="checkbox"/> k <input type="checkbox"/> b <input type="checkbox"/> d <input type="checkbox"/> f <input type="checkbox"/> h <input type="checkbox"/> j			PROGRAM OUTCOMES:		<input type="checkbox"/> a <input type="checkbox"/> c <input type="checkbox"/> e <input type="checkbox"/> g <input type="checkbox"/> i <input type="checkbox"/> k <input type="checkbox"/> b <input type="checkbox"/> d <input type="checkbox"/> f <input type="checkbox"/> h <input type="checkbox"/> j
Degree Requirements		<input type="radio"/> Degree Requirement <input type="radio"/> Free Elective <input type="radio"/> Other <input type="radio"/> Core Course <input type="radio"/> Tech Elective		Degree Requirements		<input type="radio"/> Degree Requirement <input type="radio"/> Free Elective <input type="radio"/> Other <input type="radio"/> Core Course <input type="radio"/> Tech Elective	
Prereq				Prereq NERS 484 or graduate status			
<input type="radio"/> Enforced <input type="radio"/> Advised				<input type="radio"/> Enforced <input checked="" type="radio"/> Advised			
Credit Restrictions				Credit Restrictions			
Level of Credit		Credit Hours	Contact Hrs/Wk	Level of Credit		Credit Hours	Contact Hrs/Wk
<input type="checkbox"/> Undergrad only <input type="checkbox"/> Rackham Grad <input checked="" type="checkbox"/> Non-Rckhm Grad <input checked="" type="checkbox"/> Ugrad or Rckhm Grad	<input type="checkbox"/> Ugrad or Non-Rckhm Grad <input type="checkbox"/> All Credit types <input type="checkbox"/> Rckhm Grad w/add'l Work	Min Max 4 4	4 Number of Wks 14	<input type="checkbox"/> Undergrad only <input type="checkbox"/> Rackham Grad <input type="checkbox"/> Non-Rckhm Grad <input checked="" type="checkbox"/> Ugrad or Rckhm Grad	<input type="checkbox"/> Ugrad or Non-Rckhm Grad <input type="checkbox"/> All Credit types <input type="checkbox"/> Rckhm Grad w/add'l Work	Min Max 3 3	3 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) <input checked="" type="checkbox"/> Lec <input type="checkbox"/> Sem <input type="checkbox"/> Dis <input type="checkbox"/> Other _____ <input type="checkbox"/> Rec <input type="checkbox"/> Lab <input type="checkbox"/> Ind	Grading <input checked="" type="checkbox"/> A-E <input type="checkbox"/> CR/NC <input type="checkbox"/> P/F <input type="checkbox"/> S/U	Location <input checked="" type="checkbox"/> Ann Arbor <input type="checkbox"/> Biological Station <input type="checkbox"/> Camp Davis <input type="checkbox"/> Extension
Graded Section <input checked="" type="checkbox"/> Lec <input type="checkbox"/> Sem <input type="checkbox"/> Dis <input type="checkbox"/> Other _____ <input type="checkbox"/> Rec <input type="checkbox"/> Lab <input type="checkbox"/> Ind	Course Is Y Graded <input type="checkbox"/>	

Cognizant Faculty Member: _____ Title _____
 Kimberlee Kearfott Professor

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

Approval Info <input type="checkbox"/> Curriculum Comm.	Approved by Name _____	Approved Date _____	Submitted By: <input type="checkbox"/> Home Dept. <input type="checkbox"/> Cross-listed Dept.
<input type="checkbox"/> Faculty	_____	_____	Department Chair Name Ronald Gildenbach
<input type="checkbox"/> Cross listed Unit 1	_____	_____	Chair Signature <i>Ronald Gildenbach</i>
<input type="checkbox"/> Cross listed Unit 2	_____	_____	Home Dept. Nuclear Engin & Radiolog Sci
			Cross-listed _____
			Dept(s) _____

SUPPORTING STATEMENT

Students now taking the course are previously NERS undergraduates with stronger backgrounds than previously, so a lot of topics can be covered more quickly. Fewer problems will also be worked overall.

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

Detail the Special requirements

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

Form Number

2254

Date 10/21/2011

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

Effective Term Winter 2012

Course Offer Freq ☒ Indefinitely
☐ One term only

A. CURRENT LISTING

B. REQUESTED LISTING

Home Department		Course Number		Home Department		Course Number	
Cross Listed Course Information				NERS Nuclear Engin & Radiolog Sci		590	
Course Title				Course Title		Special Topics in Nuclear Engr and Radiological Sciences II	
TITLE ABBRE- VIATION	Time Sched Max = 19 Spaces Transcript Max = 20 Spaces			TITLE ABBRE- VIATION	Time Sched Max = 19 Spaces Transcript Max = 20 Spaces	Spec Topics Spec Topics	
Course Description				Course Description for Official Publication (Max = 50 words)		Selected advanced topics such as neutron and reactor physics, reactor core design, and reactor engineering. The subject matter will change from term to term.	
PROGRAM OUTCOMES:		<input type="checkbox"/> a <input type="checkbox"/> c <input type="checkbox"/> e <input type="checkbox"/> g <input type="checkbox"/> i <input type="checkbox"/> k <input type="checkbox"/> b <input type="checkbox"/> d <input type="checkbox"/> f <input type="checkbox"/> h <input type="checkbox"/> j		PROGRAM OUTCOMES:		<input type="checkbox"/> a <input type="checkbox"/> c <input type="checkbox"/> e <input type="checkbox"/> g <input type="checkbox"/> i <input type="checkbox"/> k <input type="checkbox"/> b <input type="checkbox"/> d <input type="checkbox"/> f <input type="checkbox"/> h <input type="checkbox"/> j	
Degree Requirements		<input type="radio"/> Degree Requirement <input type="radio"/> Free Elective <input type="radio"/> Other <input type="radio"/> Core Course <input type="radio"/> Tech Elective		Degree Requirements		<input type="radio"/> Degree Requirement <input type="radio"/> Free Elective <input type="radio"/> Other <input type="radio"/> Core Course <input type="radio"/> Tech Elective	
Prereq		<input type="radio"/> Enforced <input type="radio"/> Advised		Prereq		<input type="radio"/> Enforced <input type="radio"/> Advised	
Credit Restrictions				Credit Restrictions			
Level of Credit		Credit Hours		Level of Credit		Credit Hours	
<input type="checkbox"/> Undergrad only <input type="checkbox"/> Rackham Grad <input type="checkbox"/> Non-Rackham Grad <input checked="" type="checkbox"/> Ugrad or Rackham Grad		Min Max 1 3		<input type="checkbox"/> Undergrad only <input type="checkbox"/> Rackham Grad <input type="checkbox"/> Non-Rackham Grad <input checked="" type="checkbox"/> Ugrad or Rackham Grad		Min Max 1 4	
<input type="checkbox"/> Ugrad or Non-Rackham Grad <input type="checkbox"/> All Credit types <input type="checkbox"/> Rackham Grad w/add'l Work		Contact Hrs/Wk variabl Number of Wks 14		<input type="checkbox"/> Ugrad or Non-Rackham Grad <input type="checkbox"/> All Credit types <input type="checkbox"/> Rackham Grad w/add'l Work		Contact Hrs/Wk varia Number of Wks 14	
Repeatability (Indi Research, Dir. Study, Dissertation): Is this course repeatable?				Repeatability (Indi Research, Dir. Study, Dissertation): Is this course repeatable?			
<input checked="" type="radio"/> Yes <input type="radio"/> No				<input checked="" type="radio"/> Yes <input type="radio"/> No			
Max Hours? 10				Max Times? 3			
Can it be repeated in the same term?				Can it be repeated in the same term?			
<input checked="" type="radio"/> Yes <input type="radio"/> No				<input checked="" type="radio"/> Yes <input type="radio"/> No			
Class Type(s)		Grading		Cognizant Faculty Member:		Title	
<input checked="" type="checkbox"/> Lec <input type="checkbox"/> Sem <input type="checkbox"/> Dis <input type="checkbox"/> Other <input type="checkbox"/> Rec <input type="checkbox"/> Lab <input type="checkbox"/> Ind		<input checked="" type="checkbox"/> A-E <input type="checkbox"/> CR/NC <input type="checkbox"/> P/F <input type="checkbox"/> S/U		NERS Faculty			
Graded Section		Location		Grad Course: Attach nomination if Cognizant Faculty is not a regular graduate faculty			
<input checked="" type="checkbox"/> Lec <input type="checkbox"/> Sem <input type="checkbox"/> Dis <input type="checkbox"/> Other <input type="checkbox"/> Rec <input type="checkbox"/> Lab <input type="checkbox"/> Ind		<input checked="" type="checkbox"/> Ann Arbor <input type="checkbox"/> Biological Station <input type="checkbox"/> Camp Davis <input type="checkbox"/> Extension					
Course Is Y Graded <input type="checkbox"/>							
Approval Info		Approved by Name		Submitted By:		Chair Signature	
<input type="checkbox"/> Curriculum Comm.				<input checked="" type="checkbox"/> Home Dept. <input type="checkbox"/> Cross-listed Dept.		Chair Name	
<input type="checkbox"/> Faculty				Home Dept. Nuclear Engin & Radiolog Sci		Chair Signature	
<input type="checkbox"/> Cross listed Unit 1				Cross-listed			
<input type="checkbox"/> Cross listed Unit 2				Dept(s).			

SUPPORTING STATEMENT

By increasing the variable credit hours from 1-3 to 1-4 will allow NERS faculty more flexibility. This change will be consistent with the special topics course NERS 490.

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

Detail the Special requirements



Course Approval Request Form

Office of the Registrar, University of Michigan

1210 LSA Building
500 S. State Street
Ann Arbor, MI 48109-1382
Phone: 734.763.2113
Fax: 734.936.3148
ro.curriculum@umich.edu
ro.umich.edu



CHECK APPROPRIATE BOXES FOR ALL CHANGES

Action Requested

- ☐ New Course
☒ Modification of Existing Course
☐ Deletion of Existing Course

Date of Submission:
Effective Term: Winter 2012

<input type="checkbox"/>	Course Offered	DO NOT USE ONLY Date Received: Date Completed: Completed By:
	<input type="checkbox"/> Indefinitely	
	<input type="checkbox"/> One term only	

CURRENT LISTING

REQUESTED LISTING

<input type="checkbox"/>	Dept (Home): Information Subject: SI Catalog: 650			Dept (Home): Subject: Catalog:		
<input checked="" type="checkbox"/>	<input type="checkbox"/> Course is Cross-Listed with Other Departments			<input checked="" type="checkbox"/> Course is Cross-Listed with Other Departments		
	Department	Subject	Catalog Number	Department CSE	Subject EECS	Catalog Number 549
<input type="checkbox"/>	Course Title (full title) Information Retrieval			Course Title (full title)		
<input type="checkbox"/>	Abbreviated Title (20 char)			Abbreviated Title (20 char)		
<input type="checkbox"/>	Course Description (Please limit to 50 words and attach separate sheet if necessary)					
<input type="checkbox"/>	Full Term Credit Hours Undergraduate Min: Graduate Min: 3.00 Undergraduate Max: Graduate Max: 3.00			Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:		
<input type="checkbox"/>	Course Credit Type select one					
<input type="checkbox"/>	Repeatability <input type="checkbox"/> Course is Repeatable for Credit Maximum number of repeatable credits:			<input type="checkbox"/> Course is Y graded <input type="checkbox"/> Can be taken more than once in the same term		

Subject: SI Catalog: 650			
<input type="checkbox"/>	Grading Basis <input type="checkbox"/> Graded (A – E) <input type="checkbox"/> Credit/No Credit <input type="checkbox"/> Satisfactory/Unsatisfactory <input type="checkbox"/> Pass/Fail <input type="checkbox"/> Business Administration Grading <input type="checkbox"/> Not for Credit <input type="checkbox"/> Not for Degree Credit <input type="checkbox"/> Degree Credit Only	Add Consent <input type="checkbox"/> Department Consent <input type="checkbox"/> Instructor Consent <input type="checkbox"/> No Consent	Drop Consent <input type="checkbox"/> Department Consent <input type="checkbox"/> Instructor Consent <input type="checkbox"/> No Consent


	CURRENT LISTING	REQUESTED LISTING
<input type="checkbox"/>	Advisory Prerequisite (254 char)	Advisory Prerequisite (254 char)
<input type="checkbox"/>	Enforced Prerequisite (254 char)	Enforced Prerequisite (254 char)
<input type="checkbox"/>	Minimum grade requirement:	Minimum grade requirement:
<input type="checkbox"/>	Credit Exclusions	Credit Exclusions
<input type="checkbox"/>	<div style="display: flex; justify-content: space-between;"> <div> Course Components <input type="checkbox"/> Lecture <input type="checkbox"/> Seminar <input type="checkbox"/> Recitation <input type="checkbox"/> Lab <input type="checkbox"/> Discussion <input type="checkbox"/> Independent Study </div> <div> Graded Component <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> </div> </div>	Terms Typically Offered (Please select only one) [blank] or [blank]
Instructor Name: _____ Instructor Title: _____		

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED

Contact Person: Marsha Antal Email: mwhitish Phone: 615.8247

Curriculum Committee:	Date:
Dept Chair(s):	Date:
Home Department:	Date: 11/9/11
Cross-Listed Department:	Date: 11/11/11
Cross-Listed Department:	Date:
Cross-Listed Department:	Date:

Memorandum

To: Fred Terry, Chair, CoE Curriculum Committee
From: David Kieras, Chair, CSE Program Committee, EECS Department 
Regarding: Proposed changes to the CS-Engineering Program
Date: Nov. 3, 2011

On Oct. 21, 2011, the faculty of the CSE Division of the EECS Department approved a set of changes to the CS-Engineering degree program, which have also been approved by the EECS Department-level Curriculum Committee.

These changes are explained and summarized in the attached document, and specified in the attached sample schedule. We wish to have these approved by the College, to take effect Fall 2012.

Approvals:



Greg Wakefield, Chair, EECS Department Curriculum Committee



Marios C. Papaefthymiou, Chair, CSE Division, EECS Department

Proposed Changes to the CS-Engineering Program

Over the last couple of years, the Committee developed a set of small but worthwhile changes to the CS-Engineering program; implementing them was delayed because of possible interactions with the LSA program. Now that the basic decisions have been made for the LSA program, it is time to bring these CS-Engineering changes to the faculty for approval.

Attached is the Sample Schedule for the program. The changes are as follows:

1. Math 214 is now the "default" third Math course, followed by either Math 215 or 216, to meet CoE's 4 math courses expectation. Other linear algebra courses (e.g. Math 217) are accepted. This reflects our consensus that linear algebra is the single most useful of the set of 200-level courses required by CoE, and so should be the one recommended to students. This change is allowed under current CoE policy.
2. Math 465 is allowed as a substitute for EECS 203, as recommended by the theory faculty. Prerequisite adjustments will be made for downstream courses in a future batch of small course modifications.
3. The probability/statistics requirement can now be met by either Stats 250 or Stats 412. Note that Statistics allows only partial credit if both are taken, a strong indication that they have considerable overlap. The Committee feels that either is satisfactory for meeting the requirement. Stats 426 or IOE 265 is also accepted, but experience shows that few students take them. In fact the IOE course has usually been closed to our students, so removing it from the mainstream of the requirements corrects a misleading impression.
4. The Upper Level CS Elective (ULCS) Requirement and the Major Design Experience (MDE) Requirement are now separated. Our MDE courses were originally built on ULCS courses and until recently, all EECS MDE courses have also been ULCS courses. After considerable discussion, the committee concluded that the goals of these two types of courses are usually very different, resulting in very different kinds of content and activities, which the current structure did not deal with very well. For example, marginal students have been known to take as many MDE courses as they could to meet the ULCS requirement, resulting in an over-exposure to team projects and an under-exposure to our many excellent electives. Separating the requirements will make it easier in the future to offer a larger variety of MDE courses, and move to more consistency in the level of our ULCS courses.

The student is now required to take 16 credits (i.e. four courses) in the ULCS category (the same as before), but as a separate requirement, a 4 credit MDE course. These 4 credits were moved from the Flexible Technical Elective (FTE) Requirement. A 3 credit MDE course is accepted if an additional credit of FTE is taken. An MDE course that is also a ULCS course cannot be "double counted" as an ULCS course.

The Chief Advisor can allow a student to take a non-CS MDE courses, but if so, the student must have a total of 2 additional credits of CS electives in the FTE category to meet ABET specifications.

Finally, the MDE course and its accompanying TCHNCLCM 497 and EECS 496, are now shown as a "package" in the sample schedule to encourage students to take them simultaneously.

Total Terms:									
Credit Hours	1	2	3	4	5	6	7	8	
Subjects Required by all Programs (55 hours)									
Mathematics 115, 116, and 214 ¹	12	4	4	-	4	-	-	-	-
Mathematics 215 or 216	4	-	-	-	-	4	-	-	-
Engineering 100, Introduction to Engineering	4	-	4	-	-	-	-	-	-
Engineering 101, Introduction to Computers	4	4	-	-	-	-	-	-	-
Chemistry 125/126 and 130, or Chemistry 210 and 211 ²	5	5	-	-	-	-	-	-	-
Physics 140 with Lab 141 ³	5	-	5	-	-	-	-	-	-
Physics 240 with Lab 241 ³	5	-	-	5	-	-	-	-	-
Intellectual Breadth	16	4	4	-	4	4	-	-	-
Program Subjects (24 hours)									
EECS 203 Discrete Mathematics ⁴	4	-	-	4	-	-	-	-	-
EECS 280 Programming and Elementary Data Structures	4	-	-	4	-	-	-	-	-
EECS 281 Data Structures and Algorithms	4	-	-	-	4	-	-	-	-
EECS 370 Introduction to Computer Architecture	4	-	-	-	-	4	-	-	-
STATS 250 or STATS 412 ⁵	3	-	-	-	-	-	3	-	-
EECS 376 Foundations of Computer Science	4	-	-	-	-	-	4	-	-
TCHCLCM 300	1	-	-	-	-	-	1	-	-
Major Design Experience (8 hours)									
Approved MDE CS course ⁶	4	-	-	-	-	-	-	4	-
EECS 496 Major Design Experience Professionalism	2	-	-	-	-	-	-	2	-
TCHCLCM 497 ⁷	2	-	-	-	-	-	-	2	-
Technical Electives (26 hours)									
Upper Level CS Technical Electives ⁸	16	-	-	-	-	-	4	4	8
Flexible Technical Electives ^{9, 10}	10	-	-	-	4	4	-	-	2
General Electives (15 hours)									
Total	128	17	17	16	16	16	16	16	14

Notes:

C- Rule: Among science, engineering and mathematics courses, a grade of C- or below is considered unsatisfactory.

Credits from a course may only be used to fulfill a single requirement (no double counting) .E.g., credits used to satisfy the MDE requirement cannot be used to also fulfill the Upper-level CS or Flexible Technical Elective requirement.

¹ The requirement for Math 214 can be satisfied by Math 217, 417, or 419.

² If you have a satisfactory score or grade in Chemistry AP, A-Level, IB Exams or transfer credit from another institution for Chemistry 130/125/126 you have met the Chemistry Core Requirement for the College of Engineering. Students who qualify are encouraged to take CHEM 210 (4 hours) & CHEM 211 (1 hour) as a replacement for CHEM 130 (3 hours), CHEM 125 (1 hour), and CHEM 126 (1 hour).

³ If you have a satisfactory score or grade in Physics AP, A-Level, IB Exams or transfer credit from another institution for Physics 140/141 and 240/241 you will have met the Physics Core Requirement for the College of Engineering.

⁴ Math 465 can be used to satisfy this requirement.

⁵ Probability/Statistics Course: STAT 426 and IOE 265 can be used to satisfy this requirement. STATS 250 and IOE 265 are 4 credit courses; if this is elected, the extra credit is counted toward Flexible Technical Electives.

⁶ An Approved Major Design Experience (MDE) Computer Science course, see the EECS Undergraduate Advising Office for the current list. Must be taken in the same semester as EECS 496 and TCHCLCM 497. A 3-credit MDE course can be used if a total of 11 credits of Flexible Technical Electives are elected.

⁷ Technical Communication: TCHNCLCM 497 must be taken concurrently with a major design experience (MDE) course and EECS 496.

⁸ Upper Level CS Technical Electives (ULCS): Approved Computer Science courses at the 300-level or higher. See the EECS Undergraduate Advising Office for the current list.

⁹ Flexible Technical Electives (FTEs): Approved courses at the 200+ level. ULCS courses can also be used as FTEs. See the EECS Undergraduate Advising Office for the current list. If a 3-credit MDE course is elected, a total of 11 credits of FTE are required.

¹⁰ A maximum of 4 credits of EECS 499 (or other upper-level directed/independent study) may be applied to Flexible Technical Electives. Anything beyond 4 credits will be applied toward General Electives.