

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

**Agenda**

**February 21, 2012**

**1:30-3:00 p.m.**

**Room 265 Chrysler Center**

1. Approval of Minutes From 01-24-2012
2. Course Approval Forms
3. Credit by Test for Language—James Holloway
4. Prescribed program and Second Bachelors Degrees

**University of Michigan  
College of Engineering  
Curriculum Committee Meeting  
Tuesday January 24, 2012  
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, M. Bernitsas, Y. Bozer, E. Durfee, J. Holloway, D. Kieras, E. Larsen, L. Meadows, M. Moldwin, S. Montgomery, J. Pan, R. Robertson, S. Vozar, F Ward

Members Absent: L. Bernal, A. Gallimore, T. Olson

The minutes of the last meeting (January 24, 2012) were approved, with some additions: There was a vote online after the meeting to change the subject code for Entrepreneurship.

The vote was 15 yes, 0 no, 0 abstain on moving forward on the entrepreneurship course code without requiring a CoE Faculty vote. James Holloway has ENTR as the course code. It is available and used for similar reasons at some other schools. This will be an information item to the Faculty.

**Course Approval Forms**

**These Courses Were Approved:**

AERO 588    New Course  
AOSS 474 (X-Listed with EARTH 474)    New Course  
EECS 566    New Course (Changed Course Number from 661 to 566) Decided at the meeting to have the EECS department to submit a ca form to delete EECS 661  
ENGR 190    Modification—Changed Description; Changed Level of Credit from:  
Min 1 Max 4 *to: Min 1 max 6*  
ENGR 290    New Course  
ENGR 390    Modification—Changed Description  
ENGR 490    Modification—Changed Description  
SI 650    Modification—Approved Cross Listing with EECS 549

**[Adjournment:** Motion to adjourn was made and seconded

**Motion carried (approved)**

**Next Meeting: February 21, 2012 Room 265 Chrysler Center**

## COURSE APPROVAL FORMS

BME 584 (X-Listed with CHE 584 and BIOMATLS 584) Modification—Changing Title  
from: Tissue Engineering *to: Advances in Tissue Engineering*

ME 548      New Course

NAME 483    New Course

THE UNIVERSITY OF MICHIGAN -- COLLEGE OF ENGINEERING

Course Approval Request

College Curriculum Committee, 1420 Lurie Engineering Center Building

Form Number

2251

Date 10/19/2011

Effective Term Winter 2012

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

Course Offer Freq

- Indefinitely
- One term only

A. CURRENT LISTING

B. REQUESTED LISTING

<p>Home Department _____ Course Number _____</p> <p><input type="checkbox"/> Cross Listed Course Information</p> <p><input checked="" type="checkbox"/> Course Title Tissue Engineering</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">TITLE ABBREVIATION</td> <td style="width: 20%;">Time Sched Max = 19 Spaces</td> <td style="width: 60%;"></td> </tr> <tr> <td></td> <td>Transcript Max = 20 Spaces</td> <td></td> </tr> </table> <p><input type="checkbox"/> Course Description</p> <p><b>PROGRAM OUTCOMES:</b> <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</p> <p>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</p> <p>Prereq <input type="radio"/> Enforced <input type="radio"/> Advised</p> <p><input type="checkbox"/> Credit Restrictions</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2">Level of Credit</th> <th rowspan="2">Credit Hours Min Max</th> <th rowspan="2">Contact Hrs/Wk Number of Wks</th> </tr> <tr> <td><input type="checkbox"/> Undergrad only</td> <td><input type="checkbox"/> Ugrad or Rckhm Grad <input type="checkbox"/> R</td> </tr> <tr> <td><input type="checkbox"/> Rackham Grad</td> <td><input type="checkbox"/> Ugrad or Non-Rckhm Grad</td> <td></td> <td></td> </tr> <tr> <td><input type="checkbox"/> Non-Rckhm Grad</td> <td><input type="checkbox"/> All Credit types</td> <td></td> <td></td> </tr> </table>	TITLE ABBREVIATION	Time Sched Max = 19 Spaces			Transcript Max = 20 Spaces		Level of Credit		Credit Hours Min Max	Contact Hrs/Wk Number of Wks	<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			<p>Home Department _____ Course Number _____</p> <p>BIOMEDE Biomedical Engineering 584</p> <p><input type="checkbox"/> Cross Listed Course Information</p> <p>CHE Chemical Engineering 584</p> <p>Biomaterials 584</p> <p><input type="checkbox"/> Course Title Advances in Tissue Engineering</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">TITLE ABBREVIATION</td> <td style="width: 20%;">Time Sched Max = 19 Spaces</td> <td style="width: 60%;">Adv in Tissue Engr</td> </tr> <tr> <td></td> <td>Transcript Max = 20 Spaces</td> <td>Adv in Tissue Engr</td> </tr> </table> <p><input type="checkbox"/> Course Description for Official Publication (Max = 50 words)</p> <p>Fundamental engineering and biological principles underlying field of tissue engineering are studied, along with specific examples and strategies to engineer specific tissues for clinical use (e.g., skin). Student design teams propose new approaches to tissue engineering challenges</p> <p><b>PROGRAM OUTCOMES:</b> <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</p> <p>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</p> <p>Prereq MCDB 310 or BiolChem 415 or Chem 351, Chem 517, or equivalent biology course; senior standing <input type="radio"/> Enforced <input checked="" type="radio"/> Advised</p> <p><input type="checkbox"/> Credit Restrictions</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2">Level of Credit</th> <th rowspan="2">Credit Hours Min Max</th> <th rowspan="2">Contact Hrs/Wk Number of Wks</th> </tr> <tr> <td><input type="checkbox"/> Undergrad only</td> <td><input checked="" type="checkbox"/> Ugrad or Rckhm Grad <input type="checkbox"/> I</td> </tr> <tr> <td><input type="checkbox"/> Rackham Grad</td> <td><input type="checkbox"/> Ugrad or Non-Rckhm Grad</td> <td>3 3</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Non-Rckhm Grad</td> <td><input type="checkbox"/> All Credit types</td> <td>3 3</td> <td>14</td> </tr> </table>	TITLE ABBREVIATION	Time Sched Max = 19 Spaces	Adv in Tissue Engr		Transcript Max = 20 Spaces	Adv in Tissue Engr	Level of Credit		Credit Hours Min Max	Contact Hrs/Wk Number of Wks	<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	3 3		<input type="checkbox"/> Non-Rckhm Grad	<input type="checkbox"/> All Credit types	3 3	14
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<p>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</p>																																									
<p><input checked="" type="checkbox"/> Lec <input type="checkbox"/> Sem <input type="checkbox"/> Dis <input type="checkbox"/> Other _____</p> <p><input type="checkbox"/> Rec <input type="checkbox"/> Lab <input type="checkbox"/> Ind</p> <p>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</p> <p>Course Is Y Graded <input type="checkbox"/></p>		<p>Cognizant Faculty Member: _____ Title _____</p> <p>David Kohn Professor</p> <p>Jan Stegemann Associate Professor</p> <p>Grad Course: Attach nomination if Cognizant Faculty is not a regular graduate faculty</p>																																							
<p>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</p>		<p>Approved by Name _____ Approved Date _____</p> <p>Submitted By: <input checked="" type="checkbox"/> Home Dept. <input type="checkbox"/> Cross-listed Dept.</p> <p>Department Chair Name _____ Chair Signature _____</p> <p>Home Dept. BiomedE Douglas Noil</p> <p>Cross-listed Dept(s) CHE Mark A Burns</p> <p>BMS Paul H Kretzbach</p>																																							

**SUPPORTING STATEMENT**

The name change reflects the emphasis on recent advances in the field, as is appropriate for a graduate level course. Also, the title change is intended to distinguish the course from a similarly named course (BiomedE 474, Intro to Tissue Engr.)

*(Lined area for the supporting statement)*

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

Detail the Special requirements

*(Lined area for detailing special requirements)*

**Biomedical Engineering/Chemical Engineering/Dentistry 584  
Tissue Engineering  
Winter 2006**

**I. Logistics**

*Days/Times:* Lectures: Tuesday/Thursday 1:30-3:00

*Location:* 1303 EECS

*Professor:* David H. Kohn, Ph.D.  
Departments of Biomedical Engineering, College of Engineering  
Biologic and Materials Sciences, School of Dentistry

*Offices:* 2213 Dentistry (2nd floor of research tower - taller of 2 buildings across  
from Chemistry Building on N. Univ. Ave.)  
2107 Gerstacker

*Office Hours:* By Appointment (In general, I'm on N. Campus & accessible after class)

*Phone:* 764-2206

*Fax:* 647-2110

*E-mail:* [dhkohn@umich.edu](mailto:dhkohn@umich.edu)

***Readings and Lecture Materials:***

- Articles and slides pertaining to each lecture will be made available on CTools
- Other than the first day, no hard copies of material will be brought to class; it is your responsibility to download files and print out
- It is expected that students will have read the articles prior to class
- Slides that I lecture from contain more information than slides in CTools – some combination of handouts and writing in class best facilitates learning the material. Handouts are intended to help you assimilate and organize lecture material. They are designed to provide a framework for your note taking; they are not a substitute for your presence and active learning.

## II. Accessing Course Handouts on CTools

- Go to U of M Homepage (<http://www.umich.edu>)
- Under *Quick Links* on the bottom right, click on *CTools*
- From the CTools main page (<http://ctools.umich.edu>), click on *Login* on the upper right
- Enter your unique name and password
- Choose *CHE 584 001 W06* on the upper panel
- Click on *Resources* on the left side
- You should see a list of folders for each lecture
- Click on the folder of interest and you should see and be able to open uploaded files containing slides and articles

### III. Course Goals

- 1) Students will develop a global perspective of the interdisciplinary issues involved in tissue engineering, focusing on 3 areas of the tissue engineering triad:

Cell biology issues  
Materials science and other engineering issues  
Integrated engineering and biology issues

After discussing these 3 areas, the strategies used to engineer specific organ systems will be discussed.

- 2) Apply engineering/quantitative analyses to biological problems
- 3) Familiarization with literature

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- 4) Critical thinking and analysis

- 5) Communication of ideas



#### IV. Course Requirements/Grading

Exam <sup>1</sup>	35%
Design Project <sup>2</sup>	55%
- Oral Presentation	25%
- Written Proposal	30%
Class Participation (including proposal review) <sup>3</sup>	10%

<sup>1</sup> The exam will be short answer, both quantitative and qualitative, focusing on the major concepts addressed in lectures and readings.



<sup>2</sup> Guidelines for the oral presentation and written proposal will be distributed and discussed in detail in lecture # 6 (24 Jan). Groups (formed by me) will define a problem of their choice in tissue engineering, pose research question(s)/hypotheses, a detailed methodology to attack the problem(s), and write a comprehensive NIH-style research proposal to address the question(s)/hypotheses.

Students will work in teams of 3-5, assigned such that each group has diversity in terms of background and experience (i.e. undergraduate/graduate students, engineering/biology backgrounds).

Prior to finalizing a topic, **each group must meet with me at least once to discuss their topic (all group members are required to attend this meeting).**

The order of the oral presentations will be determined randomly. A completed draft of the proposal will be due at the time of the oral presentation. The final proposal, incorporating reviewer (DK + class) suggestions, is **due 25 April** (1 week after the last oral presentation). Therefore, the first group to give an oral presentation/hand in their written proposal will have the longest time to edit their proposal, whereas the group that has the longest time to prepare their oral presentation/written proposal will have the shortest time to revise theirs. The grade for the final written proposal will be docked 5% if the completed draft is not ready at the time of oral presentation, and the final report shall be docked 1% for each day it is late.

<sup>3</sup> Students are required to actively participate in class discussions during lectures. In addition, student groups will evaluate the other groups' proposal presentations, and a brief summary of this review (less than one page) will be due from each group at the next class.

<b>Tentative Syllabus (Depending on Number of Group Presentations)</b>			
<b>Date</b>	<b>Topic</b>	<b>Assignment Due</b>	
05 January	Course introduction/Logistics		
<b>Cell Biology Topics</b>			
10 January	Cell culture	 <b>Meet w/DK @ least once about topic</b>	
12 January	Cell sourcing and stem cells		
17 January	Extracellular matrices		
19 January	Molecular basis for extracellular regulation of cell function		
24 January	Writing a proposal/Form teams/Choose dates for presentations	 <b>Proposal topic</b>	
<b>Materials Science Topics</b>			
26 January	Naturally-derived matrices		
31 January	Synthetic polymeric matrices		
02 February	Synthetic matrices with designed biological activity		
07 February	Bioactive ceramics		
09 February	Biocompatibility, Natural Healing Response		
<b>Integrated Engineering/Biological Topics</b>			
14 February	Mass transport in biological systems and Bioreactors		
16 February	Tissue induction/Drug delivery/Gene therapy approaches		
21 February	Mechanical stimulation of engineered tissues		
<b>Specific Applications</b>			
23 February	Engineering skin	<b>Abstract and Specific Aims</b>	
<b>28 February</b>	<b>No Class – Winter Break</b>		
<b>02 March</b>	<b>No Class – Winter Break</b>		
07 March	Immunoisolated cell transplantation		
09 March	Engineering bone and cartilage		
14 March	Engineering liver		
16 March	Patent, regulatory, and economic issues		
21 March	Vascular engineering or study break		
<b>23 March</b>	<b>Exam</b>		
<b>Class Presentations</b>			
28 March	Student presentation* - 1	<b>Written proposal</b>	
30 March	Student presentation* - 2	<b>Written proposal</b>	
04 April	Student presentation* - 3	<b>Written proposal</b>	
06 April	Student presentation* - 4	<b>Written proposal</b>	
11 April	Student presentation* - 5	<b>Written proposal</b>	
13 April	Student presentation* - 6	<b>Written proposal</b>	
18 April	Student presentation* - 7	<b>Written proposal</b>	
<b>25 April</b>	<b>Revised proposals due – all groups</b>		

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 1/4/2012

Effective Term Fall 2012

Course Offer Freq  Indefinitely  
 One term only

**A. CURRENT LISTING**

**B. REQUESTED LISTING**

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**SUPPORTING STATEMENT**

ME 548 teaches dynamical systems techniques for students who work on the cutting edge of dynamics, vibrations and control. The geometrical view provided by this course will allow students to tackle a huge variety of problems arising in rigid body dynamics, flexible structures, fluid-structure interactions, fluid dynamics, electromechanical systems and biomechanical systems. They shall also learn techniques to tackle dynamical problems relevant both in mechanical engineering and other fields such as biological circuit design, naval engineering analysis, or characterization of nonlinear biomechanical processes.

To meet new demands in the field of engineering, modern mechanical engineers cannot focus their attention only on narrow applications or only on theoretical analysis. They must be capable also to apply advanced theoretical knowledge to many different problems and understand how specific solutions help them target the large-scale interdisciplinary problems of the 21st century. To meet these demands, an introductory-level graduate course is needed that can provide the students with fundamental knowledge about complex, nonlinear, multi-scale problems arising in engineering. The course must also build up the foundation for higher-level courses targeting specific topics in dynamics. ME 548 will satisfy these needs.

The course has been taught under the Special Topics lecture number of ME 599 by Prof. Bogdan Epureanu and has received enrollments of 10-20 students each time with a mix of ME, NAME, AERO & Kinesiology students. It has received a lot of positive feedback from the students and many new students ask for the course to be taught again.

**Teaching History**

\*Fall 2010, 18 students, Q1 4.95, Q2 4.95, Q3 4.90

\*Winter 2006, 14 students, Q1 4.75, Q2 4.95, Q3 4.75

\*Winter 2004, 16 students, Q1 4.20, Q2 4.61, Q3 4.30

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

Detail the Special requirements

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**Instructor:** Prof Gábor Orosz  
Department of Mechanical Engineering  
Autolab G034, [orosz@umich.edu](mailto:orosz@umich.edu)

**Lectures:** M 2:30pm - 4:00pm  
W 2:30pm - 4:00pm

**Discussion:** Th 4:30pm - 5:30pm

**Office hours:** M 4:00pm - 5:00pm, Autolab G034  
W 4:00pm - 5:00pm, Autolab G034  
Th 5:30pm - 6:30pm

**Prerequisites:** An undergraduate level course in dynamics/vibrations/control, for example, ME360.  
You are expected to have knowledge of linear algebra and differential equations.

**Course books:** D. W. Jordan and P Smith, *Nonlinear Ordinary Differential Equations*, 4<sup>th</sup> edition, Oxford University Press, 2007

**Additional reading:** J. Guckenheimer and P. Holmes, *Nonlinear Oscillations, Dynamical Systems, and Bifurcations of Vector Fields*, Springer, 1997  
Y. A. Kuznetsov, *Elements of Applied Bifurcation Theory*, 2<sup>nd</sup> edition, Springer, 1998  
P. Glendinning, *Stability, Instability and Chaos: An Introduction to the Theory of Nonlinear Differential Equations*, Cambridge University Press, 1994  
B. D. Hassard, N. D. Kazarinoff, and Y.-H. Wan, *Theory and Applications of Hopf bifurcation*, Cambridge University Press, 1981  
M. Gruiz and T. Tel, *Chaotic Dynamics: An Introduction Based on Classical Mechanics*, Cambridge University Press, 2006

**Course description:** Geometrical representation of the dynamics of nonlinear systems. Stability and bifurcation theory for autonomous and periodically forced systems. Chaos and strange attractors. Introduction to pattern formation. Applications to various problems in rigid-body dynamics, flexible structural dynamics, fluid-structure interactions, fluid dynamics, and control of electromechanical systems.

**Website:** We will maintain a course website on which we will post material (assignments, solutions, handouts, etc.) as well as announcements. You can access our course website at <https://ctools.umich.edu/portal>

**The Engineering Honor Code:** <http://www.engin.umich.edu/students/honorcode/>

No member of the community shall take unfair advantage of any other member of the community.

**Assignments:** Eleven homework assignments will be set during the term that will be posted on the course's website. Homework sets are **due no later than the start of class on Wednesdays**, and late homework will NOT be accepted. The lowest homework score for the term will be dropped. Homework solutions will be available through the course web site. You are encouraged to discuss and work on homework together but the final document must represent your own understanding of the material.

**Examinations:** Midterm Exam: Oct 26 (Wed), 2:30pm - 4:00pm, in class  
Final Exam: Dec 16 (Fri), 1:30pm - 3:30pm

The exams will be closed book. One sheet of notes (8.5" by 11") will be permitted for the exams (one-sided for the midterm and double-sided for the final).

<b>Grading:</b>	Homework	30%
	Midterm Exam	30%
	Final Exam	40%

**No class on:** Oct 17 (Mon) – Fall study break

**Additional rules:** no laptops, cell phones, ipods, ipads, etc. during the class

**Course Schedule** (tentative 12/2/11):

Week 01 – Constraints in mechanical systems, Lagrange equations of the second kind

Week 02 – State space representation, Linear stability

Week 03 – Lyapunov stability, Domain of attraction, LaSalle-Krasowski invariance principle

Week 04 – Steady state bifurcations (saddle-node, pitchfork, transcritical), Catastrophe theory

Week 05 – Nonlinear oscillations in conservative systems, Forced nonlinear oscillations

Week 06 – Lienard and Bendixon Criteria, Hopf bifurcation, Normal form calculations

Week 07 – Stable and unstable manifolds, Center manifold reduction

Week 08 – Parametric excitation, Floquet theory, Mathieu Equation

Week 09 – Numerical continuation techniques

Week 10 – Pattern formation and Turing instability

Week 11 – Stroboscopic and Poincare maps

Week 12 – Sensitivity to initial conditions and Lyapunov exponents, Strange attractors and fractal dimension,  
Smale horseshoe and symbolic dynamics

Week 13 – Chaotic vibrations in digital control

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 1/26/2012

Effective Term Fall 2012

Course Offer Freq

- Indefinitely
- One term only

A. CURRENT LISTING

B. REQUESTED LISTING

<p>Home Department _____ Course Number _____</p> <p><input type="checkbox"/> Cross Listed Course Information</p> <p><input type="checkbox"/> Course Title</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">TITLE ABBREVIATION</td> <td style="width: 15%;">Time Sched Max = 19 Spaces</td> <td style="width: 70%;"></td> </tr> <tr> <td></td> <td>Transcript Max = 20 Spaces</td> <td></td> </tr> </table> <p><input type="checkbox"/> Course Description</p> <p><b>PROGRAM OUTCOMES:</b> <input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> d <input type="checkbox"/> e <input type="checkbox"/> f <input type="checkbox"/> g <input type="checkbox"/> h <input type="checkbox"/> i <input type="checkbox"/> j <input type="checkbox"/> k</p> <p><b>Degree Requirements</b> <input type="radio"/> Degree Requirement <input type="radio"/> Core Course <input type="radio"/> Free Elective <input type="radio"/> Tech Elective <input type="radio"/> Other</p> <p>Prereq <input type="radio"/> Enforced <input type="radio"/> Advised</p> <p>Credit Restrictions</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2">Level of Credit</th> <th rowspan="2">Credit Hours Min Max</th> <th rowspan="2">Contact Hrs/Wk Number of Wks</th> </tr> <tr> <td><input type="checkbox"/> Undergrad only</td> <td><input type="checkbox"/> Ugrad or Non-Rckhm Grad</td> </tr> <tr> <td><input type="checkbox"/> Rackham Grad</td> <td><input type="checkbox"/> All Credit types</td> <td></td> <td></td> </tr> <tr> <td><input type="checkbox"/> Non Rckhm Grad</td> <td><input type="checkbox"/> Rckhm Grad w/add'l Work</td> <td></td> <td></td> </tr> <tr> <td><input type="checkbox"/> Ugrad or Rckhm Grad</td> <td></td> <td></td> <td></td> </tr> </table>	TITLE ABBREVIATION	Time Sched Max = 19 Spaces			Transcript Max = 20 Spaces		Level of Credit		Credit Hours Min Max	Contact Hrs/Wk Number of Wks	<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				<p>Home Department _____ Course Number 483</p> <p>NAVARCH Naval Arch &amp; Marine Engin</p> <p><input type="checkbox"/> Cross Listed Course Information</p> <p><input type="checkbox"/> Course Title</p> <p>Marine Control Systems</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">TITLE ABBREVIATION</td> <td style="width: 15%;">Time Sched Max = 19 Spaces</td> <td style="width: 70%;">Marine Control Sys</td> </tr> <tr> <td></td> <td>Transcript Max = 20 Spaces</td> <td>Marine Control Sys</td> </tr> </table> <p>Course Description for Official Publication (Max = 50 words)</p> <p>This course covers the theoretical foundation and practical design aspects of marine control systems. 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<p><b>Approval Info</b></p> <p><input type="checkbox"/> Curriculum Comm.</p> <p><input type="checkbox"/> Faculty</p> <p><input type="checkbox"/> Cross listed Unit 1</p> <p><input type="checkbox"/> Cross listed Unit 2</p>	<p><b>Approved by Name</b> _____</p> <p>_____</p> <p>_____</p>	<p><b>Approved Date</b> _____</p> <p>_____</p> <p>_____</p>	<p>Submitted By: <input checked="" type="checkbox"/> Home Dept. <input type="checkbox"/> Cross-listed Dept.</p> <p><b>Department Chair Name</b> Naval Arch &amp; Marine Engin</p> <p>Home Dept. _____</p> <p>Cross-listed Dept(s) _____</p>	<p><b>Chair Signature</b></p> <p></p>
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**SUPPORTING STATEMENT**

This senior/first year graduate level course will cover the theoretical foundation and practical design aspects of marine control systems. The course will be divided into six (6) modules:

- 1 Introduction of control systems
- 2 Control-oriented system modeling
- 3 Dynamic behavior and stability
- 4 Linear systems and state feedback
- 5 Frequency domain analysis and design
- 6 PID control
- 7 Control implementation and computer controlled systems
- 8 Marine Control Applications and case studies

The goal is to expose students to the important system concepts, current design challenges, and available analysis and design tools for marine control systems. Fundamental concepts of signals and systems will be emphasized in the context of dynamic behavior and feedback design; real world applications and design issues will be introduced to illustrate the principles and demonstrate the utility of tools. Simulations and control design software tools will also be introduced in connection with the mathematical model to practice controller implementation and performance evaluation of marine systems. Introducing the topics of systems and controls to our undergraduate and first year graduate students is critically important for keeping the NAME curriculum up-to-date. In response to the comments raised by our external advisory board members, we offered the "Marine Control Systems" as a special topic course for the fall of 2011 to pilot the course. Students who participated in the course responded very favorably in the course evaluation and reported that they had learned a lot (Q1=4.63 with 87.5% response rate).

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

Detail the Special requirements

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Proposed: December 15, 2011

Revised: December 16, 2011  
February 16, 2012

**Problem:** The CoE currently grants 100 and 200 level credit to students for taking a language test, even when they were educated in that language, or spoke that language at home during their primary and secondary education.

**Proposed New Bulletin Text:**

The CoE will grant credit for students passing a language placement test offered by the College of LSA provided the student has previously studied that language in a course in their secondary education. This will be verified using their high school or college transcripts. AP language credit will also be granted.

“Study of a language in a course” means a student took coursework designed to teach them the fundamental vocabulary, grammar, pronunciation, and writing system of that language as a foreign language, as opposed to a class in literature, argumentative or essay writing, or creative writing in a language whose fundamentals they already knew.

The CoE values the study of language, so even when credit might not be granted, students are encouraged to take any language placement test for which they may be qualified, so that they can be properly placed in a more advanced language course.

**Comments:**

- This is in alignment with our general principle that we do not give college credit for life experience, but do give credit for documented educational experiences. In this case we are extending this to say that LSA certifies that the skill level is appropriate for the granting of college credit, even if the education was in high school.
- We treat fluency in English as a requirement for admission, so we do not grant credit for students who may study English as a language (as opposed to literature or composition or the similar subjects taught in our English Department) at another institution.
- Students transferring from another institution of higher education can transfer language coursework via the normal transfer process. They cannot earn language credit by placement test.

## Second Bachelor's Candidates Academic Rules Proposal

Second Bachelor's candidates are defined to be those applicants who already possess a bachelor's degree and are seeking admission into one of the undergraduate programs offered at the College of Engineering. At present the CoE bulletin contains only the following rules directly addressing these students:

### **Admission of Graduates of Other Colleges/Admission of Students Via Prescribed Program**

Students who have completed an undergraduate degree program or applicants for transfer admission who have completed a substantial number of the requirements for the bachelor's degree in engineering can be admitted via a *Prescribed Program*. The Prescribed Program is a detailed outline of the courses that must be taken for completion of the engineering degree and is determined by the program advisor for students who could satisfy requirements in 30-40 credit hours at Michigan (at least 30 of which must be at the 300-level or higher). The student must obtain a grade of "C" or better in each course of the prescribed program. For questions, contact the Office of Recruitment and Admissions.

This program is uncomfortably loose. It allows (at least as practiced) a student to receive a UM degree without meeting all of our degree requirements. In particular, it explicitly ignores the 50 credit hour residency requirements, and in application has sometimes ignored the 30 credit residency requirement. Recently it has been used (or at least explored) to provide Masters students with a bachelors degree "picked up along the way..." This program is also unnecessary.

**Proposal:** The Prescribed program will be eliminated. All students should meet all of the degree requirements for the degree they are seeking, including residency rules, 128 credit hour rule, etc., with due credit given for transferred courses. The prescribed program does not need to be replaced; second degree students and students with substantial numbers of credits from previous higher education can be admitted with transfer credits from their previous academic experience, much like traditional transfer students.

## **Proposal: Second Bachelor's Candidates Admissions Guidelines, Transfer Credit Policies, and Degree Requirements**

**All such students should be encouraged to first consider a Masters degree in engineering.** Each CoE Masters program has (or should be encouraged to have) a set of remedial coursework identified that will allow such students to prepare themselves for a Masters in an engineering discipline.

For students who have previously earned a bachelors degree and who do elect to pursue admission for an additional bachelors degree, the following rules and policies will apply:

1. Students may not be admitted to pursue a degree that is substantially similar to a degree they already hold, or declare into such a similar degree program. The Office of the Associate Dean for Undergraduate Education reserves the right to decide if two degrees are too similar to allow admission or declaration.
2. Students currently in a UM graduate program will not be admitted to an undergraduate program in CoE.
3. In order to be admitted for a second bachelors degree candidates will be evaluated with the following guidelines in mind:
  - Within the last 10 years they must have taken Calculus 1 and 2, Physics 1, Chemistry, English Composition and/or introductory Technical Communications, and introductory Programming, and have an academic record that suggests high levels of accomplishment. These courses can have completed as part of their original degree, but could also have been taken for other reasons. Students who completed such courses more than 10 years before admission must demonstrate advanced proficiency in math, science, composition and programming through successful completion of more advanced coursework, again within the last 10 years before admission. Students will not be admitted to the CoE in order to meet these basic requirements.
4. Coursework from the student's previous academic record, including credits used to satisfy requirements for a previous degree, will be eligible for entry on the UM academic record, except that credits can only count for one previous degree (no counting of credits between 3 or more degrees).
5. Credits from the previous record can be moved to the UM transcript at any time, but will be placed on the transcript as prior to the first term of UM enrollment (as is current policy). This can have a retroactive tuition impact. Transferred courses will not be removed from the transcript.
6. To graduate, students must successfully complete all of the degree requirements in place at their term of admission, using the appropriate combination of transfer and UM credit. Program advisors can allow substantially equivalent substitutions from transferred courses. Students with a previous engineering degree must complete an additional 14 credit hours in pertinent technical subjects.