The University of Michigan
College of Engineering
Curriculum Committee

Agenda
September 16, 2003
1:30-3:30 p.m.
GM ROOM
Fourth Floor Lurie Engineering Center

1. Introductions

2. Curricular Overview – Greg Hulbert

3. Approval of Minutes from April 15, 2003 Meeting

4. HU/SS Minor Wording Change

5. Tentative – Draft for the NASA proposal for ENGR 450 – Robert Dennis

6. Enforced/Advised Pre-requisites

7. Course Approval Forms

University of Michigan
College of Engineering
Curriculum Committee Meeting
Tuesday April 15, 2003
1:30-3:30 p.m.
Lurie Engineering Center GM Room
Minutes

Armin Troesch called the meeting to order at 1:45 p.m.

Members Present: A. Troesch, J.Fessler, P. Friedmann, W. Hansen, G. Herrin, J. Holloway , G.Hulbert, S.Montgomery , S. Pang, H. Peng, R. Robertson, P. Samson , S. Takayama

Members Absent: V. Chung, G.Tyson (EECS)

Guest: Levi Thompson

Motion to approve the minutes of the last meeting

Armin Troesch noted that on page 2 of the minutes under: CoE Bulletin 2002-03 HU/SS Requirement in paragraph 2 – this should read: Some of the courses that students are **taking** are questionable. The correct word was added.
As a consequence of reviewing the minutes, it was decided that since there was no conclusion regarding the HU/SS Requirement, it was decided to recommend that early next year the undergrad advisors report to the Committee what is working and what isn't. Gary Herrin noted that the undergrad advisors meet the second Thursday of every month and he will put this on the agenda and form a group to get some feedback regarding this.

The minutes of the last meeting were approved

Armin Troesch wanted to respond to an e-mail from Will Hansen regarding the CEE Thermal Class. It relates to the minutes in the sense that at the last meeting a motion was asked for to recognize that NERS, NAME and other programs had made program changes as a consequence of ME 230/235/330/335 sequence. These changes can still be incorporated into the new Bulletin up to May 1. It was also suggested at that time to look at the Chemistry/Physics 4 hours and 8 hours and 10 hours and 5 hours issue. He noted that at looking back at this and AERO and CIVIL still list Physics and Chemistry as a 14 hour instead of a 17 hour option.

Change in CHEM 125/126 listing – Information Only

Copies of the LS&A course approval forms for the modifications to Chem 125 and Chem 126 were passed out. Now Chem 125 and Chem 126 are one credit hour courses.
The question was raised as to what would happen if a student fails Chem 125 – they would have to take them both again.

SGUS Degrees in Macromolecular Science and Engineering and Plastics Engineering – Continued Discussion

Continued discussion on a SGUS Degree in Macromolecular Science and Engineering and Plastics Engineering. Armin Troesch stated that this is somewhat different that the previous SGUS Degrees, since the department is doing this somewhat independently of the undergraduate program. There was a question on exactly how to proceed. Armin said that the issue is what the philosophy is behind SGUS. One point in the Rackham rules is that there needs to be very close coordination between the undergraduate advisor and the graduate advisor, which implies a close coordination between the two programs.
In the past, SGUS was in the department, or set up with tight integration and this program seems to have a loose integration.
It was agreed that the College should require a closer coordination, sample schedules and both departments signing off on the program. A straw vote was taken regarding this Proposal (presented at the April 1 meeting), with the results of this vote to be given to David Martin.
The results were: Approval: 2; Against: 4; Abstaining: 5. It was noted that the people abstaining would vote either yes or no with more information or more study.

Course Approvals

Armin Troesch called for a motion to approve the following courses. This was moved and seconded.
Motion Carried (approved)

EECS 501(X-Listed with AERO 552) Modification – Removed AERO 552 as Cross-Listed Course; Changed Prerequisites from: Graduate Standing **to: EECS 401 or Graduate Standing**; Changed level of credit from: Rackham Grad **to: all credit types.**

EECS 643 (PSYCH 643 Home) Modification – Changed Course Description.

ENGR 301 New Course

ENGR 591 New Course

HU/SS – Jeanne Murabito

Jeanne Murabito handed out a draft dated 4/10/03 for Humanities and Social Sciences. This incorporates the changes that have been suggested at a previous CoE CC meeting and also adding two words under #3: **practice** and an additional request from Judy Hyde in MSE to add **conversations.**
Peretz Friedmann noted that the second sentence : It is designed to *help strengthen communication and analytical skills while acquiring the* social, cultural, political, and economic background crucial to fulfilling the College of Engineering's purpose of "preparing our graduates to begin a lifetime of technical and professional creativity and leadership in their chosen field". seemed awkward. It was decided to change it to: **It is designed to *provide the students with* social, cultural, political and economic background crucial to fulfilling the College of Engineering's**

purpose of "preparing our graduates to begin a lifetime of technical and professional creativity and leadership in their chosen field".
Also it was decided to change the numbers: 1, 2, 3 under **Requirement** (the second paragraph on the first page) to Roman Numerals (I, II, III).

Armin Troesch called for a motion to approve these HU/SS policy changes.
This was moved and seconded.
Motion Carried (approved) 1 abstention (related to the use of Roman Numerals)

Jeanne noted that this will go into the CoE Bulletin for now, but in the fall this will be on the agenda for the program advisors to give feedback to the College on how this is working.

Presentation to Armin Troesch – Levi Thompson

Levi Thompson thanked the Committee for all their efforts in attending and working with the College of Engineering Curriculum Committee Meetings.
Armin Troesch was thanked for his outstanding leadership of this committee, and wished good luck in his new position as the Chairman of the Naval Architecture and Marine Engineering Department.
He was presented with a framed certificate and a leather portfolio.

Greg Hulbert will be the new Chairman of the College of Engineering Curriculum Committee.

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

Next Meeting
Tuesday, September 16, 2003
1:30-3:30 p.m.
GM Room-LEC

Frequently Asked Prerequisite Questions

1. How does a department initiate the enforcement of a prerequisite?

   A Course Approval Form will need to be submitted to the Registrar's Office. Course Approval Forms will need to be submitted one month prior to the beginning of graduate registration for the term in which a prerequisite will be enforced. Graduate registration for Winter 2004 begins November 17, 2003. Course Approval Forms will need to be received in the Registrar's Office by October 17, 2003.

2. Does registration into a class satisfy a prerequisite (i.e., if a student registers for a prerequisite in Spring, can they register for a class with the prerequisite for Fall)?

   Yes, the software treats courses that haven't been graded as if they have been satisfactorily completed.

3. If a pre-requisite has a grade-based condition (e.g., minimum grade point = 2.0), will registration into a class satisfy the prerequisite?

   Yes, courses that haven't been graded will be treated like they have satisfied a grade-based condition. External transfer courses, test and other credit, and "P" graded courses will also be treated like they have satisfied grade-based conditions.

4. Will a course prerequisite need to be satisfied before a student can get on a waitlist?

   Yes.

5. If a prerequisite has an "academic level" condition (e.g., senior), will the calculation of academic level include those courses that haven't been graded?

   The software looks at the projected academic level for the term into which a student is enrolling when determining if a prerequisite has been satisfied. For example, if a student is enrolling into a Fall 03 class during the Winter 03 term, the student's projected academic level for Fall 03 will include CTP earned through Fall 02 and all elected courses in Winter 03, Spring 03, Spring/Summer 03, and Summer 03. The software treats these courses as if they have been satisfactorily completed.

6. Will MPathways recognize REP courses when enforcing prerequisites?

   Yes, repeated courses will be used to determine if a prerequisite has been satisfied.

7. Does a course's prerequisite need to be taken in a student's current career in order to enroll in a course with an enforced prerequisite?

   No.

8. Can co-requisites be enforced in MPathways?

   Currently, co-requisites can't be enforced.

9. Can a department override a course prerequisite?

   Yes, the student can be given permission to enroll in the class with the prerequisite.

10. Are enforced prerequisites placed on a course or a class?

    Enforced prerequisites, submitted via the Course Approval Form, are placed on a course.

11. Can both enforced and advisory prerequisites be placed on a course?

    Yes.

12. Will enforced and advisory prerequisites display in Wolverine Access?

    Yes. In the Course Catalog section, an enforced prerequisite will display as a ***course prerequisite*** *and an advisory prerequisite will display as an* ***advisory prerequisite.***

    In the Class Search section, an enforced prerequisite will display as a ***prerequisite*** *and an advisory prerequisite will display as an* ***advisory prerequisite.***

13. What happens if a student does not complete a prerequisite class with the minimum grade point per unit required, fails or withdraws from it?

    When a Course Approval Form with a new prerequisite is received in the Registrar's Office, a query will be developed to identify those students who didn't meet the prerequisite condition/s. This query will be run by the Registrar's Office once grades have been processed for that term. The list of identified students will be sent to the departments so that communications can be sent to the students, letting them know that they will be withdrawn from the class/es. The departments are responsible for communicating with their students and will need to send a list of those students who will need to be withdrawn to the Student Services Office in the Registrar's Office.

Course Approvals

COURSE APPROVAL FORMS

For September 16, 2003 CoE CC Meeting

EECS 495	New Course
ME 587 (X-Listed with MFG 587) adding Operations & Management Sciences 587 as X-Listed Course, Changing Course Title, Changing Course Description.	Modification
NAME 331	New Course
NAME 332	New Course
NAME 431	New Course
NAME 531	New Course

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

Print

Form Number 1099

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 4/28/2003
Effective: W04

A. CURRENT LISTING

Home Department | Div # | Course Number

Cross Listed Course Information

Course Title

TITLE ABBREVIATION — Time Sched Max = 19 Spaces; Transcript Max = 20 Spaces

Course Description

PROGRAM OUTCOMES:
☐ a ☐ b ☐ c ☐ d ☐ e ☐ f ☐ g ☐ h ☐ i ☐ j ☐ k

Degree Requirements ○ Degree Requirement ○ Tech Elective ○ Core Course ○ Other ○ Free Elective

Prerequisites ○ Enforced ○ Advised

Credit Restrictions

Level of Credit
☐ Undergrad only ☐ All Credit types
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work
☐ Non-Rckhm Grad
☐ Ugrad or Rckhm Grad
☐ Ugrad or Non-Rckhm Grad

Credit Hours Min Max

Contact Hrs/Wk ____ Number of Wks ____

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

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

B. REQUESTED LISTING

Home Department: EECS | Div #: 252 | Course Number: 495

Cross Listed Course Information

Course Title: Patent Fundamentals for Engineers

TITLE ABBREVIATION — Time Sched Max = 19 Spaces: Patent Fund Eng; Transcript Max = 20 Spaces: Patent Fund Eng

Course Description for Official Publication (Max = 50 words)
This course covers the fundaments of patents for Engineers. The first part of the course focuses on the rules and codes that govern patent prosecution, and the second part focuses on claim drafting and amendment writing. Other topics covered include litigation, ethics and licensing.

PROGRAM OUTCOMES:
☐ a ☐ b ☐ c ☒ d ☐ e ☒ f ☒ g ☐ h ☐ i ☐ j ☒ k

Degree Requirements ○ Degree Requirement ○ Tech Elective ○ Core Course ○ Other (•) Free Elective

Prerequisites (Junior or Senior Standing) or Graduate Standing
○ Enforced (•) Advised

Credit Restrictions

Level of Credit
☐ Undergrad only ☐ All Credit types
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work
☐ Non-Rckhm Grad
☐ Ugrad or Rckhm Grad
☒ Ugrad or Non-Rckhm Grad

Credit Hours Min 4 Max 4

Contact Hrs/Wk 4 Number of Wks 14

Printing Information (Optional) ☒ Print the course in the Bulletin ☒ Print the course in the Time Schedule

Terms & Freq. of Offering ■ I ☐ II ☐ IIIa ☐ IIIb ☐ III ☐ Yearly ■ Alter Years ☐ Even Years ☐ Odd Years
Half term ☐ 1st ☐ 2nd

Cognizant Faculty Member: Mohammed Islam **Title** Professor

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

Approval
☐ Curriculum Comm. ____
☐ Faculty ____
☐ Rackham ____
☐ Cross listed Unit 1 ____
☐ Cross listed Unit 2 ____

Submitted By: ■ Home Dept. ☐ Cross-listed Dept.
Name, Signature & Department
Home Dept. EECS Jeff Fessler Jeffrey A Fessler 5/03
Cross-listed Dept(s). ____

Form Number

1099

SUPPORTING STATEMENT

Approved by EECS faculty email vote April 2003.

This course was piloted in Fall 2002 as an EECS 498 special topics course. The course had 19 students, and it went quite well. The students were somewhat overwhelmed by the amount of material, but this will be trimmed in the future. Patent Fundamentals are a significant part of any well-rounded engineering curriculum, and we should offer such a course here at U of M. In addition to being a full professor in EECS, I am also a Registered Patent Agent in the USPTO and have authored over 97 patents. Hence, I feel that I have the credentials to teach the course. I have developed a full set of notes for the course as well as problems (materials were provided to Professor Herrin). Whereas the first half of the course is more lecture plus problems oriented, the second half is more workshop oriented, with the students working in teams to do claim drafting or amendment writing. This course does not describe why the law is what it is (that is left for Law School), but just takes the law as a given and applies it to patents. The first part of the course focuses on the rules and regulations by which a patent is judged by the USPTO. The second half of the course gives guidelines for claim drafting and amendment writing, and then the students work in teams on various patent exercises. Finally, other topics are covered such as litigation, licensing and ethics.

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

Print

Form Number 1076

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 3/12/2003
Effective Winter 2004

A. CURRENT LISTING

	Home Department	Div #	Course Number
X	Mechanical Engineering		587

Cross Listed Course Information
Manufacturing 587

X Course Title
RECONFIGURABLE AGILE MANUFACTURING

TITLE ABBREVIATION	
Time Sched Max = 19 Spaces	
Transcript Max = 20 Spaces	

X Course Description
Product-process-market modeling. Principles of mass production. Agility in product design. Agility in manufacturing processes. Flexible line boring. Optimal batch size. System reliability. Product quality. CAD/CAM and CNC. Agility in marketing and delivery. Virtual organizations. Agile scheduling. Using agile strategies in product development.

PROGRAM OUTCOMES:
☐a ☐b ☐c ☐d ☐e ☐f ☐g ☐h ☐i ☐j ☐k

Degree Requirements ○ Degree Requirement ○ Tech Elective ○ Core Course ○ Other ○ Free Elective

☐ Prerequisites ○ Enforced ○ Advised

☐ Credit Restrictions

☐ **Level of Credit**
☐ Undergrad only ☐ All Credit types
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work
☐ Non-Rckhm Grad
☐ Ugrad or Rckhm Grad
☐ Ugrad or Non-Rckhm Grad

Credit Hours Min ____ Max ____
Contact Hrs/Wk ____ Number of Wks ____

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

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

B. REQUESTED LISTING

	Home Department	Div #	Course Number
	Mechanical Engineering		587

Cross Listed Course Information
Manufacturing 587
Operations & Management Sciences 587

Course Title
Reconfigurable Manufacturing for Product, Process, and Business

TITLE ABBREVIATION	
Time Sched Max = 19 Spaces	RECONFIGURABLE MFG
Transcript Max = 20 Spaces	RECONFIGURABLE MFG

Course Description for Official Publication (Max = 50 words)
Product-process-business relationships. Manufacturing paradigms and the market. Product design for customization. Paradoxical products. Mass-production model. Mass-customization principles. Reconfigurable manufacturing systems - design and principles. Reconfigurable machine tools. Impact of system configurations on productivity, quality, scalability, and convertibility. IT for market responsiveness. Business models. Reconfigurable enterprises. Introduction to financial planning and business plans.

PROGRAM OUTCOMES:
☐a ☐b ☐c ☐d ☐e ☐f ☐g ☐h ☐i ☐j ☐k

Degree Requirements ○ Degree Requirement ○ Tech Elective ○ Core Course ○ Other ○ Free Elective

Prerequisites one 500 level MFG or DES or BUS class ○ Enforced ⊙ Advised

Credit Restrictions

Level of Credit
☐ Undergrad only ☒ All Credit types
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work
☐ Non-Rckhm Grad
☐ Ugrad or Rckhm Grad
☐ Ugrad or Non-Rckhm Grad

Credit Hours Min 3 Max 3
Contact Hrs/Wk 3 Number of Wks 14

Printing Information (Optional) ☒ Print the course in the Bulletin ☐ Print the course in the Time Schedule

Terms & Freq. of Offering ☐ I ■ II ☐ IIIa ☐ IIIb ☐ III ☐ Yearly ■ Alter Years ☐ Even Years ☐ Odd Years
Half term ☐ 1st ☐ 2nd

Cognizant Faculty Member: Yoram Koren **Title** Professor

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

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

Submitted By: ■ Home Dept. ☐ Cross-listed Dept.
Name, Signature & Department
Home Dept. Mechanical Engineering
Cross-listed Dept(s). Manufacturing
OMS

Form Number

Form Number
1076

SUPPORTING STATEMENT

New course description better describes the current course content. Adding Business School to the cross-listing.

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

Print

Form Number **1124**

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 9/10/2003

Effective Fall 2003

A. CURRENT LISTING

Home Department | Div # | Course Number

Cross Listed Course Information

Course Title

TITLE ABBREVIATION — Time Sched Max = 19 Spaces | Transcript Max = 20 Spaces

Course Description

PROGRAM OUTCOMES:
☐a ☐b ☐c ☐d ☐e ☐f ☐g ☐h ☐i ☐j ☐k

Degree Requirements ○ Degree Requirement ○ Tech Elective ○ Core Course ○ Other ○ Free Elective

Prerequisites ○ Enforced ○ Advised

Credit Restrictions

Level of Credit
☐ Undergrad only ☐ All Credit types
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work
☐ Non-Rckhm Grad
☐ Ugrad or Rckhm Grad
☐ Ugrad or Non-Rckhm Grad

Credit Hours Min ____ Max ____

Contact Hrs/Wk ____

Number of Wks ____

B. REQUESTED LISTING

Home Department: Naval Architecture and Marine Engineering | Div #: 284 | Course Number: 531

Cross Listed Course Information

Course Title: Adaptive Control

TITLE ABBREVIATION — Time Sched Max = 19 Spaces: Adaptive Control | Transcript Max = 20 Spaces: Adaptive Control

Course Description for Official Publication (Max = 50 words)

Models of system with unknown or time-varying parameters. Theory and algorithm for on-line parameter identification. Adaptive observers. Direct and indirect adaptive control. Model reference adaptive control. Robustness and convergence of adaptive systems. Design and analysis of nonlinear adaptive control. Application and implementation of adaptive systems.

PROGRAM OUTCOMES:
☐a ☐b ☐c ☐d ☐e ☐f ☐g ☐h ☐i ☐j ☐k

Degree Requirements ○ Degree Requirement ◉ Tech Elective ○ Core Course ○ Other ○ Free Elective

Prerequisites: Graduate standing or permission of instructor
○ Enforced ⊙ Advised

Credit Restrictions

Level of Credit
☐ Undergrad only ☒ All Credit types
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work
☐ Non-Rckhm Grad
☐ Ugrad or Rckhm Grad
☐ Ugrad or Non-Rckhm Grad

Credit Hours Min 3 Max 3

Contact Hrs/Wk 3

Number of Wks 14

C.

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

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

Graded Section ○ Lec ○ Rec ○ Sem ○ Lab ○ Dis ○ Ind ○ Other

Grading ☐ A-E ☐ CR/NC ☐ S/U ☐ P/F ☐ Y

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

Printing Information (Optional) ☒ Print the course in the Bulletin ☒ Print the course in the Time Schedule

Terms & Freq. of Offering ■ I ☐ II ☐ IIIa ☐ IIIb ☐ III — ■ Yearly ☐ Alter Years ☐ Even Years ☐ Odd Years

Half term ☐ 1st ☐ 2nd

Cognizant Faculty Member: Jing Sun **Title** Associate Professor

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

Approval

☐ Curriculum Comm. _____

☐ Faculty _____

☐ Rackham _____

☐ Cross listed Unit 1 _____

☐ Cross listed Unit 2 _____

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

Name, Signature & Department

Home Dept. Michael G. Parsons, NA&ME

Cross-listed Dept(s). _____

Form Number

1124

SUPPORTING STATEMENT

The College of Engineering has lacked an advanced course in adaptive control. The addition of Dr. Jing Sun, an expert in adaptive control, to our faculty has allowed the introduction of this course to fill that need. The course is designed to serve the entire College.

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

Detail the Special requirements

Course title:	NA531 Adaptive Control
Course Function:	Graduate course. May be taken for undergraduate credit as advanced technical elective
Cognizant faculty:	Jing Sun
Credit Hours:	3 credits
Schedule:	Fall semester
Pre/corequisites:	Graduate standing or permission of instructor.
Short Description:	Models of system with unknown or time-varying parameters. Theory and algorithm for on-line parameter identification. Adaptive observers. Direct and indirect adaptive control. Model reference adaptive control. Robustness and convergence of adaptive systems. Design and analysis of nonlinear adaptive control. Application and implementation of adaptive systems.
Text:	Petros Ioannou and Jing Sun: *Robust Adaptive Control*, Karl Astrom and Bjorn Wittenmark: *Adaptive Control (2nd Edition).*

Outline and Time Allocation		hours
I.	Introduction: adaptive and feedback systems	1
II.	Stability theory	5
	a. Input/output stability	
	b. Lyapunov stability	
	c. Passivity and stability: Kalman-Yakubovich lemma	
III.	Parametric models for dynamic systems	3
IV.	On-line parameter identification	4
	a. Projection and least square adaptive laws	
	b. Parameter convergence and persistent excitation	
V.	Adaptive observers	3
	a. Adaptive Leunberger observer	
	b. Hybrid adaptive observer	
VI.	Model reference adaptive control	6
VII.	Indirect adaptive control	6
	a. Certainty equivalence principle	
	b. Swapping theory	
	c. Self-tuning regulator	
	d. Adaptive pole placement control	
	e. Adaptive optimal control	
VIII.	Robust adaptive laws	4
	a. Instability phenomena in adaptive systems	
	b. Robust modifications	
IX.	Nonlinear, multivariable, and hybrid adaptive systems	4
X.	Other adaptive and learning schemes	1
XI.	Applications of adaptive control	2
	a. Practical implementation considerations	
	b. Examples of adaptive systems	
XII.	Projects	3
Total		**42**

ABET Categories:	Engineering science 2 1/2; engineering design 1/2; other 0
Threads Served:	Environmental Impact and Constraints
Computing:	None

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

Print

Form Number 1120

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 9/9/2003
Effective Fall 2003

A. CURRENT LISTING

Home Department | Div # | Course Number

Cross Listed Course Information

Course Title

TITLE ABBREVIATION
Time Sched Max = 19 Spaces
Transcript Max = 20 Spaces

Course Description

PROGRAM OUTCOMES:
☐a ☐b ☐c ☐d ☐e ☐f ☐g ☐h ☐i ☐j ☐k

Degree Requirements ○ Degree Requirement ○ Tech Elective ○ Core Course ○ Other ○ Free Elective

Prerequisites ○ Enforced ○ Advised

Credit Restrictions

Level of Credit
☐ Undergrad only ☐ All Credit types
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work
☐ Non-Rckhm Grad
☐ Ugrad or Rckhm Grad
☐ Ugrad or Non-Rckhm Grad

Credit Hours Min ____ Max ____
Contact Hrs/Wk ____ Number of Wks ____

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

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

B. REQUESTED LISTING

Home Department: Naval Architecture and Marine Engineering | Div #: 284 | Course Number: 331

Cross Listed Course Information

Course Title: Marine Engineering I

TITLE ABBREVIATION
Time Sched Max = 19 Spaces: Marine Engineering I
Transcript Max = 20 Spaces: Marine Engineering I

Course Description for Official Publication (Max = 50 words)
Diesel engines, steam turbines, and gas turbines as marine prime movers. Thermodynamic cycles, ratings, matching to loads. Engine-propeller matching. Mechanical transmission of power to marine loads. Principles of fluid system deign. Introduction to heat transfer and heat exchangers.

PROGRAM OUTCOMES:
☒a ☐b ☒c ☐d ☒e ☐f ☐g ☐h ☐i ☒j ☒k

Degree Requirements ◉ Degree Requirement ○ Tech Elective ○ Core Course ○ Other ○ Free Elective

Prerequisites ME 235, co-requisite NA320 ○ Enforced ⊙ Advised

Credit Restrictions

Level of Credit
☒ Undergrad only ☐ All Credit types
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work
☐ Non-Rckhm Grad
☐ Ugrad or Rckhm Grad
☐ Ugrad or Non-Rckhm Grad

Credit Hours Min 3.0 Max 3.0
Contact Hrs/Wk 3 Number of Wks 14

Printing Information (Optional) ☒ Print the course in the Bulletin ☒ Print the course in the Time Schedule

Terms & Freq. of Offering ■ I ☐ II ☐ IIIa ☐ IIIb ☐ III ■ Yearly ☐ Alter Years ☐ Even Years ☐ Odd Years
Half term ☐ 1st ☐ 2nd

Cognizant Faculty Member: Michael G. Parsons, Professor; Jing Sun, Associate Professor

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

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

Submitted By: ■ Home Dept. ☐ Cross-listed Dept.
Name, Signature & Department
Home Dept. Michael G. Parsons, NA&ME
Cross-listed Dept(s). ____

Form Number

1120

SUPPORTING STATEMENT

The addition of Dr. Jing Sun to the faculty has allowed a rationalization of the marine engineering course sequence including the introduction of a specific course in Marine Electrical Engineering. Revisions also add heat transfer introduction lost with the changes to ME 230/ME 235.

NA 330 will be inactivated eventually.

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

Detail the Special requirements

Course title:	NA331 Marine Engineering I
Course Function:	Required course; third year
Cognizant faculty:	Michael G. Parsons
Credit Hours:	3 credits
Schedule:	Fall semester
Pre/co-requisites:	Prerequisite ME 235, co-requisite NA 320
Short Description:	Diesel engines, steam turbines, and gas turbines as marine prime movers. Thermodynamic cycles, ratings, matching to loads. Engine-propeller matching. Mechanical transmission of power to marine loads. Principles of fluid system design. Introduction to heat transfer and heat exhangers.
Text:	Course pack; Woud, H. K. and Stapersma, D., *Design of Propulsion and Electric Power Generation Systems*, Harrington, R. (ed.), *Marine Engineering*, SNAME; Sonntag, R., Borgnakke, C., and Van Wylen, G. *Fundamentals of Thermodynamics.*, Incropera, F. P. and DeWitt, D. P., *Introduction to Heat Transfer.*,

Outline and Time Allocation		hours
I.	Review of Thermodynamics	3
II.	Propulsion Prime Movers	15
	Overview of engine choices and their requirements	
	Diesel engines – characteristics, limitations	
	Gas turbines – characteristics, limitations	
	Steam Turbines – characteristics, limitations	
	Fuel properties, treatment, cost	
III.	Power transmission and shafting components	3
	Shafting design	
	Gearing and clutches	
	Contact stresses and the K-factor formula	
	Electric drive	
IV.	Engine-Propeller Matching	6
	Propeller law; four-quadrant properties	
	Controllable-pitch propellers	
	Off-design conditions	
	Control strategies	
V.	Pipes and Pumps	6
	Dynamic and thermodynamic principles	
	Piping head loss	
	Pump head, power, efficiency	
	Pump and pipe head/flow characteristics	
	Dimensionless parameters	
VI.	Heat Transfer	6
	Modes of heat transfer	
	Conduction	
	Heat exchanger design	
	Examinations and Reviews	3
	Total	42

ABET Categories:	Engineering science 2 1/2; engineering design 1/2; other 0
Threads Served:	Environmental Impact and Constraints
Computing:	None

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

Print

Form Number 1121

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 9/9/2003
Effective Fall 2003

A. CURRENT LISTING

Home Department | Div # | Course Number

Cross Listed Course Information

Course Title

TITLE ABBREVIATION
Time Sched Max = 19 Spaces:
Transcript Max = 20 Spaces:

Course Description

PROGRAM OUTCOMES:
☐a ☐b ☐c ☐d ☐e ☐f ☐g ☐h ☐i ☐j ☐k

Degree Requirements ( ) Degree Requirement ( ) Tech Elective ( ) Core Course ( ) Other ( ) Free Elective

Prerequisites ( ) Enforced ( ) Advised

Credit Restrictions

Level of Credit
☐ Undergrad only ☐ All Credit types
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work
☐ Non-Rckhm Grad
☐ Ugrad or Rckhm Grad
☐ Ugrad or Non-Rckhm Grad

Credit Hours Min ____ Max ____
Contact Hrs/Wk ____
Number of Wks ____

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

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

B. REQUESTED LISTING

Home Department: Naval Architecture & Marine Engineering | Div #: 284 | Course Number: 332

Cross Listed Course Information

Course Title: Marine Electrical Engineering

TITLE ABBREVIATION
Time Sched Max = 19 Spaces: Mar Electric Engin
Transcript Max = 20 Spaces: Mar Electrical Engin

Course Description for Official Publication (Max = 50 words)
Electrical circuit analysis. Electromagnetic interactions. Principles, characteristics, and properties of transformers, and DC and AC motors. Power electronics. Integrated marine electrical plants. Electrical power distribution, and control. Circuit protection. Introduction to fuel cells.

PROGRAM OUTCOMES:
☒a ☐b ☒c ☐d ☒e ☐f ☐g ☐h ☐i ☒j ☒k

Degree Requirements (•) Degree Requirement ( ) Tech Elective ( ) Core Course ( ) Other ( ) Free Elective

Prerequisites NA 331 ( ) Enforced (•) Advised

Credit Restrictions

Level of Credit
☒ Undergrad only ☐ All Credit types
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work
☐ Non-Rckhm Grad
☐ Ugrad or Rckhm Grad
☐ Ugrad or Non-Rckhm Grad

Credit Hours Min 3 Max 3
Contact Hrs/Wk 3
Number of Wks 14

Printing Information (Optional) ☒ Print the course in the Bulletin ☒ Print the course in the Time Schedule

Terms & Freq. of Offering ☐ I ■ II ☐ IIIa ☐ IIIb ☐ III
■ Yearly ☐ Alter Years ☐ Even Years ☐ Odd Years
Half term ☐ 1st ☐ 2nd

Cognizant Faculty Member: Jing Sun
Title: Associate Professor

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

Approval

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

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

Name, Signature & Department
Home Dept. Michael G. Parsons, NA&ME
Cross-listed Dept(s). _____

Form Number

1121

SUPPORTING STATEMENT

The addition of Dr. Jing Sun to the faculty has allowed a rationalization of the marine engineering course sequence including the introduction of a specific course in Marine Electrical Engineering. Revisions also add heat transfer introduction lost with the changes to ME 230/ME 235.

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

Detail the Special requirements

Course title:	NA332 Marine Electrical Engineering
Course Function:	Required course; third year
Cognizant faculty:	Jing Sun
Credit Hours:	3 credits
Schedule:	Winter semester
Pre/corequisites:	Prerequisite NA 331
Short Description:	Electrical circuit analysis. Electromagnetic interactions. Principles, characteristics, and properties of transformers, and DC and AC motors. Power electronics. Integrated marine electrical plants. Electrical power distribution and control. Circuit protection. Introduction to fuel cells.
Text:	Course pack; Woud, H. K. and Stapersma, D., *Design of Propulsion and Electric Power Generation Systems*, Elgerd, O., *Basic Electric Power Engineering;* Harrington, R. (ed.), *Marine Engineering*, SNAME; del Toro, *Electrical Machines.*

Outline and Time Allocation		hours
I.	Fundamentals of Electrical Circuit Analysis	6
II.	Principles of Electromagnetic Interactions	3
III.	Principles and Characteristics of Electrical Machines	15
	Transformers	
	DC motors – series, shunt, compound, homopolar	
	Synchronous AC generators	
	AC motors – synchronous, induction	
IV.	Power Electronics and Motor Control	6
	Fundamental components	
	Motor controllers	
V.	Power Distribution	6
	Load analysis	
	Distribution systems	
	Circuit protection	
VI.	Introduction to Fuel Cells	3
	Types	
	Characteristics	
	Examinations and Reviews	3
	Total	42

ABET Categories:	Engineering science 2 1/2; engineering design 1/2; other 0
Threads Served:	Environmental Impact and Constraints
Computing:	None

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

Print

Form Number 1122

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 9/9/2003
Effective Fall 2003

A. CURRENT LISTING

Home Department | Div # | Course Number

Cross Listed Course Information

Course Title

TITLE ABBREVIATION
Time Sched Max = 19 Spaces
Transcript Max = 20 Spaces

Course Description

PROGRAM OUTCOMES:
☐ a ☐ b ☐ c ☐ d ☐ e ☐ f ☐ g ☐ h ☐ i ☐ j ☐ k

Degree Requirements ( ) Degree Requirement ( ) Tech Elective ( ) Core Course ( ) Other ( ) Free Elective

Prerequisites ( ) Enforced ( ) Advised

Credit Restrictions

Level of Credit
☐ Undergrad only ☐ All Credit types
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work
☐ Non-Rckhm Grad
☐ Ugrad or Rckhm Grad
☐ Ugrad or Non-Rckhm Grad

Credit Hours Min ____ Max ____
Contact Hrs/Wk ____ Number of Wks ____

C.

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

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

B. REQUESTED LISTING

Home Department: Naval Architecture and Marine Engineering | Div #: 284 | Course Number: 431

Cross Listed Course Information

Course Title: Marine Engineering II

TITLE ABBREVIATION
Time Sched Max = 19 Spaces: Mar Engineering II
Transcript Max = 20 Spaces: Mar Engineering II

Course Description for Official Publication (Max = 50 words)
Integrated treatment of the statics and dynamics of marine power transmission systems. Shafting design and alignment. Bearing selection and lubrication. Propeller excitation, added mass, and damping. Vibration modeling, analysis and evaluation of shafting systems: torsional, longitudinal, and lateral vibrations.

PROGRAM OUTCOMES:
☒ a ☐ b ☒ c ☐ d ☒ e ☐ f ☒ g ☐ h ☐ i ☐ j ☒ k

Degree Requirements ( ) Degree Requirement (•) Tech Elective ( ) Core Course ( ) Other ( ) Free Elective

Prerequisites NA331, NA 340 ( ) Enforced (•) Advised

Credit Restrictions

Level of Credit
☐ Undergrad only ☒ All Credit types
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work
☐ Non-Rckhm Grad
☐ Ugrad or Rckhm Grad
☐ Ugrad or Non-Rckhm Grad

Credit Hours Min 3 Max 3
Contact Hrs/Wk 3 Number of Wks 14

Printing Information (Optional) ☒ Print the course in the Bulletin ☒ Print the course in the Time Schedule

Terms & Freq. of Offering ☐ I ■ II ☐ IIIa ☐ IIIb ☐ III
Half term ☐ 1st ☐ 2nd
■ Yearly ☐ Alter Years ☐ Even Years ☐ Odd Years

Cognizant Faculty Member: Michael G. Parsons **Title** Professor

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

Approval

Submitted By: ■ Home Dept. ☐ Cross-listed Dept.
Name, Signature & Department
Home Dept. Michael G. Parsons, NA&ME
Cross-listed Dept(s). ____

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

Form Number

1122

SUPPORTING STATEMENT

The addition of Dr. Jing Sun to the faculty has allowed a rationalization of the marine engineering course sequence including the introduction of a specific course in Marine Electrical Engineering. Revisions also add heat transfer introduction lost with the changes to ME 230/ME 235.

This course replaces NA430 as a technical elective; NA430 will eventually be inactivated.

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

Detail the Special requirements

Course Title:	NA431 Marine Engineering II
Course Function:	Advanced technical selective (two of five required); fourth year May be taken for graduate credit.
Cognizant Faculty:	Michael G. Parsons
Credit Hours:	3 credits
Schedule:	Winter semester
Pre/co-requisites:	Prerequisites NA331 and NA340
Short Description:	Integrated treatment of the statics and dynamics of marine power transmission systems. Shafting design and alignment. Bearing selection and lubrication. Propeller excitation, added mass, and damping. Vibration modeling, analysis and evaluation of shafting systems: torsional, longitudinal, and lateral vibrations.
Texts:	Course pack.

Outline and Time Allocation:

		hours
I.	Shafting Design	6
	Sizing	
	Use of bearing load influence coefficients	
	Analysis of statically indeterminate beams	
	Bearing loads, uncoupled shaft slopes and deflections	
II.	Marine Bearings	3
	Types	
	Principles of hydrodynamic lubrication	
III.	Vibrations Review	3
IV.	Propeller Properties and Excitation	3
V.	Marine Propulsion System Torsional Vibration	12
	System modeling	
	Analysis	
	Reciprocating engine dynamics and excitation	
	Introduction to the structural reliability approach	
V.	Longitudinal Vibrations	5
	Modeling	
	Analysis	
VI.	Lateral Vibrations	5
	Modeling	
	Analysis	
VII.	Vibration Monitoring	2
	Examinations and Review	3
	Total	42

ABET Categories:	Engineering Science 2; Engineering Design 1; Other 0
Threads Served:	Computing and numerical methods
Computing:	Vibration and alignment analyses using MATLAB