The University of Michigan
College of Engineering
Curriculum Committee

Agenda
March 4, 2003
1:30-3:30 p.m.
GM ROOM
Fourth Floor Lurie Engineering Center

1. Approval of Minutes from March 4, 2003 Meeting

2. ME Thermal/Fluids/Heat Transfer Sequence – Greg Hulbert

3. Report on Data to Support Undergraduate Curriculum Decision Making – Jeanne Murabito and Honor Passow

4. Professional Outcome Reports – Brief Discussion

5. Chemical Engineering Items – Information Only

6. Course Approval Forms

University of Michigan
College of Engineering
Curriculum Committee Meeting
Tuesday February 11, 2003
1:30-3:00 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, H. Peng, S.Montgomery, R. Robertson S. Takayama, G.Tyson

Members Absent, V. Chung, S. Pang, P. Samson (AOSS),

Guest: Bill Kuhn (AERO)

Motion to approve the minutes of the last meeting

Regarding ENG 195 it was noted to change the wording from: *Guy Meadows (who teaches one of the sections of Engineering 195)* to Guy Meadows (*who is associated with Engineering 195*).
The minutes of the last meeting were approved

Proposal for New SGUS Program in AOSS – Sample Schedule

Bill Kuhns (Graduate Program Advisor) talked about his handout – Sample AOSS Schedule – which was requested at the last meeting, since Perry Samson had been called out of town.
Armin Troesch asked for a motion to approve this Program with what was presented last week and this week.
Motion carried (approved).

HU/SS Proposed Revisions – Jeanne Murabito

Jeanne Murabito handed out the proposed wording for HU/SS. Jeanne noted that at the last meeting, Susan Montgomery had brought up some changes from the College of Engineering/LS&A joint meeting. The first change is that American Culture and Classical Studies were moved up to the Humanities (per LS&A's suggestion). The other two changes were under *Definitions and Exceptions*: that numbers 1 and 2 supercede number 3. Jeanne noted that if there were no objections, this revision will be going into the next College of Engineering Bulletin.
Susan Montgomery wanted to change numbers 1 and 2 to read: *Any courses designated as HU or SS, regardless of any additional designation.* Jeanne noted that this would be clearer.
It was agreed that the Committee will understand it this way, and more importantly, the students will understand this better.
In number 3, the first sentence will be changed to: Courses not covered by 1 and/or 2 that are designated . . .
Armin Troesch asked for a motion to approve this new wording.

Armin noted that this is not a change in policy, but a clarification.
Motion carried (approved.)

Professional Outcomes – Jeanne Murabito

Jeanne Murabito passed out 2 handouts (Data to Support Undergraduate Curricular Decision Making, and Response to Questions) in addition to the Professional Outcomes Reports (one to each department representative). These Professional Outcomes Reports were what each department submitted last year.
Since Jeanne Murabito and Armin Troesch are turning in a report to Levi Thompson within a month, Jeanne needs any changes back by March 3. Jeanne will also be sending each department representative an electronic copy of their Professional Outcomes Report either today or tomorrow.
Armin noted that the conclusion of the Professional Outcomes Reports is that the College is strong in some areas and weak in others. Jeanne and Armin will put some information together which will highlights some conclusions which will be put into a draft to Levi Thompson.
Armin said regarding the purpose of putting this information together, that this is in response to Levi, but it has to do with ABET accreditation.

First Year Review Report – Gary Herrin

Gary Herrin talked about the First Year Review Report that he had sent out to all the Committee Members. He noted that the **First Year Courses Review Committee** served for a year and put a lot of time into this, trying to reshape Engineering 100, 101, and 195. He stated that this report was extremely controversial—which is what these reviews should be. There has been a lot of response to this report already, and he shared some of those changes. One of the early conclusions that this Committee reached was the Engineering students can't write very well. Now they are documenting how well Engineering students are learning how to write (Which is what ABET wants). Gary noted that most of the Alumni surveyed regarding this graduated before Curriculum 2000, so those students never attended Engineering 100, 101 or 195. Gary said he would like more current data than is reflected in the Senior Surveys.
Gary said that Engineering 195 is a 'free –elective' and he wants to propose to the Curriculum Committee that this course be made a 'regular' course.
Armin noted that there will be an Engineering Program Curriculum Committee, with James Holloway as one of the members, also the coordinators for Engineering 100 and Engineering 101,and possibly one or two people from this Committee.
Susan Montgomery suggested a motion that Engineering 100, 101 and 195 are valuable courses in the College of Engineering and should be supported. Armin suggested changing the motion to recognize the value of the Engineering Programs in the College, particularly Engineering 100, 101, and 195.
After some discussion as to whether or not this was appropriate for the Curriculum Committee to be involved in endorsing a program, Susan withdrew her motion.
Armin stated that this issue will be brought up at the next Faculty Meeting.

ME Thermal/Fluids/Heat Transfer Sequence – Discussion

Greg Hulbert talked about his information handout, which was included in the CoE CC Meeting packet. The process will be for this to go the Mechanical Engineering Faculty for vote this month and then to the College of Engineering Curriculum Committee Meeting March 4, and the Engineering Faculty meeting March 18.

IOE Sample Schedule – Gary Herrin

Gary Herrin talked about his handout, which was included in the CoE CC Meeting packet. He stated that this is just for information.
The Sample Schedule lists the correct credit totals students earn for Phys 140, 141, 240, 241, and Chem 125/130. The current listing in the CoE Bulletin from Fall 2000 through 2002/2003 reflects the credit totals for Physics and Chemistry that were anticipated for Curriculum 2000, but never materialized. The changes listed officially reduce their 'advertised' free electives from 12 to 9 credits, which has been the reality since Fall 2000.
Jeanne Murabito noted, when asked, that the Curriculum Committee doesn't need to approve this, since this is not really a change.

EE Degree Program changes – Discussion

Jeff Fessler told the Committee that the ECE faculty approved two "program changes" for the Electrical Engineering degree that will affect footnotes in the bulletin.
1. EECS 497 was eliminated from the long list of MDE courses in footnote 6 since it has turned out to be just a software course.
2. The restriction: "At most 4 credits of undergraduate probability may be applied to the EE degree."was added.

The EECS department chose to go the latter route because trying to preclude EECS 401/ Math425/ IOE 265 / etc. via the course approval form was too painful. So they just put it in the degree requirements.

Course Approvals

Withdrawn: AERO 285   By AERO Representative
Tabled: ENGR 4XX   New Course
      TECH COMM 400 Deletion
      TECH COMM 450 Modification – Changing Course Description
      TECH COMM 475 Modification – Changing Course Description
      TECH COMM 486 Deletion
      TECH COMM 490 Deletion
      TECH COMM 497 Deletion
      TECH COMM 499 Deletion

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

AERO 483	Modification – Changing Pre-Requisites
BIOMED E 548	Deletion
CHEM E 557	New Course
EECS 401	Modification – Changing Credit Restrictions
EECS 501	Modification – Changing Credit Restrictions

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

Next Meeting
Tuesday, March 4, 2003
1:30-3:30 p.m.
GM Room-LEC

CHEMICAL ENGINEERING DEPARTMENT
TECHNICAL ELECTIVE REQUIREMENT – For students who completed ChE 230 F'01 or later
February 2003

TECHNICAL ELECTIVE RULES

The ChE curriculum requires 6 credits of technical electives, to include:

> A minimum of 2 credits of engineering elective, with the other 4 credits coming from
> > engineering electives,
> > advanced math electives, or
> > advanced science electives.

In addition, at least one course must be outside of Chemical Engineering, and research credits cannot be used to fulfill all 6 credits of the requirement.

ENGINEERING ELECTIVES

Engineering courses must be at the 200 level or higher and with sufficient rigor, e.g. seminar courses and 1 credit programming courses don't count. Courses in AOSS are not considered engineering courses for this purpose.

Here is a sampling of popular engineering electives:

BME 401	4	Human Body: its Structure & Function	CEE 582	3	Environmental Microbiology
BME 519	4	Bioengineering Physiology	CEE 586	3,4	Industrial Ecology
ChE 444	3	Applied Chemical Kinetics	CEE 686	3	Case Studies in Environ. Sustainability
ChE 470	3	Colloids and Interfaces	IOE 201	2	Economic Decision Making
ChE 472	4	Polymer Science and Engineering	IOE 202	2	Operations Modeling
ChE 490	1-6	Directed Study, Res., Special Probs	IOE 265	4	Probability and Statistics for Engineers
ChE 517	3	Biochemical Science and Technology	MSE 242	4	Physics of Materials
ChE 518	3	Quantitative Cell Biology	MSE 350	4	Principles of Engineering Materials
ChE 519	3	Pharmaceutical Engineering	MSE 413	3	Polymeric Materials
ChE 530	3	Bioinformatics and Gene Expression	MSE 414	3	Applied Polymer Processing
CEE 260	3	Environmental Principles	ME 211	4	Introduction to Solid Mechanics
CEE 581	4	Aquatic Chemistry			

ADVANCED MATH ELECTIVES

The non-engineering courses listed below have previously been approved as Advanced Math electives

Math 354	3	Fourier Analysis and its Applications.
Math 371/Engr 371	3	Numerical Methods for Engineers and Scientists.
Math 417	3	Matrix Algebra I.
Math 425/Stats 425	3	Introduction to Probability.
Math 450	4	Advanced Mathematics for Engineers I.
Math 454	3	Boundary Value Problems for PDEs
Math 462	3	Mathematical Models.
Math 463	3	Mathematical Modeling in Biology.
Math 471	3	Introduction to Numerical Methods.
Stats 412	3	Fourier Analysis and its Applications.

The following Engineering courses might also be of interest to those interested in a mathematics emphasis:

ChE 507	3	Mathematical Modeling in Chemical Engineering
ChE 508	3	Advanced Numerical Methods
ChE 508	3	Advanced Numerical Methods
CEE 303	4	Computational Methods for Engineers and Scientists
IOE 366	2	Linear Statistical Models (ChE 360 fulfills prereqs)
IOE 465	4	Design and Analysis of Experiments

ADVANCED SCIENCE ELECTIVES

The courses listed below have previously been approved as Advanced Science electives

AOSS - Atmospheric, Oceanic and Space Sciences

AOSS 300	3	Global environmental impact of technological change
AOSS 304	3	The atmospheric and oceanic environ.
AOSS 430	3	Thermo. of the atmosphere
AOSS 432	3	Environmental radiative proc.
AOSS 459	3	Principles & Applications of Radio and Remote Sensing
AOSS 463	3	Air pollution meteorology
AOSS 464	3	The space environment
AOSS 467	3	Biogeochemical cycles
AOSS 475	3	Earth-ocean-atmosphere interactions
AOSS 479	3	Atmospheric chemistry
AOSS 480	3	The Planets: Composition, Structure, and Evolution

BIO – Biology

BIOL 207	4	Introductory microbiology
BIOL 305,6	4,3	Genetics; Lab
BIOL 307,8	3,3	Development Biology; Lab
BIOL 310	4	Intro. biochemistry
BIOL 311	4	Intro. biochemistry, self-paced
BIOL 320	3	Cellular physiology
BIOL 324	3	Biology of Cancer
BIOL 390	4	Evolution
BIOL 427	4	Molecular Endocrinology
BIOL 428	4	Cell Biology
BIOL 483	3	Limnology: Freshwater ecology

BC - Biological Chemistry - Medical School

BC 415/515	3,4	Intro. biochemistry

CHEM – Chemistry

CHEM 420	3	Intro. organic Chem..
CHEM 451	4	Intro. biochemistry
CHEM 461	3	Physical Chemistry I
CHEM 463	3	Physical Chemistry II
CHEM 511	3	Materials Chemistry

EIHLTH – Environ'l and Industrial Health (Public Health)

EIHLTH 547		Food Science

EST - Environmental Studies

EST 353	3	Energy, entropy and environment

GS - Geological Sciences

GS 425	3	Environmental geochemistry

PHYS – Physics

PHYS 340/1	3,2	Waves, Heat, and Light; Lab
PHYS 390	3	Introduction to Modern Physics
PHYS 401	3	Intermediate Mechanics
PHYS 402	3	Light

PHARMCEU – Pharmaceutics

PHARMCEU 432	3	Pharmaceutics and biopharm. 1: Introduction to dosage forms

The following Engineering courses might also be of interest to those interested in a science emphasis:

BME - Biomedical Engineering

BME 418	4	Quantitative Cell Biology

CHE – Chemical Engineering

CHE 444	3	Applied Chemical Kinetics
CHE 470	3	Colloids and Interfaces
CHE 472	4	Polymer Science and Engin.
CHE 519	3	Pharmaceutical Engineering
CHE 538	3	Statistical and Irreversible Thermodynamics

CEE - Civil and Environmental Engineering

CEE 581	3	Aquatic Chemistry
CEE 582	3	Environmental Microbiology
CEE 586 /NRE 557	3,4	Industrial Ecology

MSE - Materials Science and Engineering

MSE 410 (BME 410)	3	Design and Applications of biomaterials
MSE 413 (ChE 413)	3	Polymer materials

Check web for updates at www.engin.umich.edu/dept/cheme

CHEMICAL ENGINEERING DEPARTMENT
BIOLOGY/LIFE SCIENCE REQUIREMENT– For students who completed ChE 230 F'01 or later
February 2003

The courses listed below have been approved as Biology/Life Science electives.

Course	Credits	Title	Prerequisites
BIO – Biology			
BIOL 162	5	Introductory biology	Prior or concurrent enrollment in Chem 130
BIOL 207	4	Introductory microbiology	Biol. 162, or AP Bio level background
BC - Biological Chemistry - Medical School			
BC 415/515	3,4	Intro. biochemistry	Two terms of organic chem. No credit granted to those who have completed or are enrolled in Biol. 310 or 311 or BC 451/452.

Fulfilling the biology/life science requirement at another school:

If you are searching for a course at another school to fulfill this requirement, a good starting point is the course that is the prerequisite for biochemistry. To check whether a course at another school has already been approved as fulfilling this requirement, check the course equivalency database available at;

http://www.engin.umich.edu/students/prospective/undergraduate/admissions/transfer/external/database/

Courses that have been approved as fulfilling our bio/life science elective are labeled as such in this database. Courses not listed on this database need the approval of Dr. Montgomery to be used to fulfill this requirement.

Check web for updates at www.engin.umich.edu/dept/cheme

Proposed ChE curriculum, Winter 2003

	Hours	1	2	3	4	5	6	7	8
Subjects required by all programs									
Mathematics 115+,116+,215,216 +	16	4	4	4	4				
Engineering 100, Introduction to Engineering	4	4							
Engineering 101, Computing +	4		4						
Chemistry 130+	3	3							
Physics 140/141+, 240 /241	10	5			5				
Humanities and Social Sciences	16		4		4			4	4
(to include a course in economics)									
Advanced Science									
Biology / life science elective [1]	3						3		
Chem 210, 211, Struct and Reactiv I and Lab +	5		5						
Chem 215,216, Struct and Reactiv II and Lab +	5			5					
Chem 261, Chemical Principles +	1				1				
Chem 241/2 Analytical Chemistry	4					4			
Related Technical Subjects									
Materials elective (MSE 250)	4							4	
Technical Electives [2]	6							4	2
Program Subjects									
ChemE 230, Material & Energy Balances +	4			4					
ChemE 330, Thermodynamics +	3				3				
ChemE 341, Fluid Mechanics +	4				4				
ChemE 342, Heat and Mass Transfer +	4					4			
ChemE 343, Separation Processes +	3					3			
ChemE 344, Reaction Engr and Design +	4						4		
ChemE 360, ChemE Lab I +	4						4		
ChemE 460, ChemE Lab II	4								4
ChemE 466, Process Control and Dynamics	3							3	
ChemE 487, Chem Proc Sim and Design	4								4
	37								
Free Electives	10		3				4		3
Total	**128**	16	17	16	17	15	15	15	17

(1) See department for list of courses that satisfy the Biology/Life Science elective requirement.
(2) Technical electives must include a minimum of 2 credits of engineering elective, with the other 4 credits coming from engineering electives, advanced science, or advanced math courses. See department for list of courses that meet the engineering electives, advanced science and advanced math requirements. At least one course must be outside of Chemical Engineering. Engineering courses are to be at the 200 or higher level. Courses in AOSS are not considered engineering courses for this purpose. See department for other exceptions.
(+) Students must earn a "C-" or better in prerequisite courses indicated by the (+)

COURSE APPROVAL FORMS

Sub-Committee Review for March 4, 2003 CoE CC Meeting

AERO 536   New Course

BME 533 (Cross-listed with Kines(home department)   New Course

BME 556   Modification – Prerequisite added—Sr. Standing, enforced; Level of
                 Credit changed to ugrad or Rckhm Grad; Changing Terms

CHE 487   Modification – Prerequisite changed from MSE 250, preceded or
                 accompanied by CHE 344 to CHE 360, MSE 250 preceded or
                 accompanied by CHE 344

CEE 522   New Course

EECS 467(Cross-listed with ME 467 & MFG 467)   Deletion

EECS 568(Cross-Listed with MFG 570   Deletion

ME 235   New Course

ME 320   New Course

ME 335   New Course

MSE 480(Cross-Listed with MFG 480)   Modification – Changing Terms

MSE 489(Cross-Listed with MFG 489)   Modification – Changing Terms

TECH COMM 400   Deletion

TECH COMM 450   Modification – Changing Course Description

TECH COMM 475   Deletion

TECH COMM 486   Deletion

TECH COMM 490   Deletion

TECH COMM 497   Deletion

TECH COMM 499   New Course

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

Print

Form Numbe

1 0 2 6

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 1/29/2003

Effective Fall 2003

A. CURRENT LISTING

Home Department		Div #	Course Number

Cross Listed Course Information

Course Title

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	
	Transcript Max = 20 Spaces	

Course Description

B. REQUESTED LISTING

Home Department	Div #	Course Number
Aerospace Engineering	235	536

Cross Listed Course Information

Course Title
Electric Propulsion

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	Electric Propulsion
	Transcript Max = 20 Spaces	Electric Propulsion

Course Description for Official Publication (Max = 50 words)
Introduction to electric propulsion with an overview of electricity and magnetism, atomic physics, non-equilibrium flows and electrothermal, electromagnetic, and electrostatic electric propulsion 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
○ Enforced ○ Advised

Credit Restrictions

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 Aero 335, Senior Standing
⊙ Enforced ○ Advised

Credit Restrictions

Level of Credit

		Credit Hours		Contact
☐ Undergrad only	☐ All Credit types	Min	Max	Hrs/Wk _____
☐ Rackham Grad	☐ Rckhm Grad w/add'l Work			
☐ Non-Rckhm Grad				Number
☐ Ugrad or Rckhm Grad		____ ____		of Wks _____
☐ Ugrad or Non-Rckhm Grad				

Level of Credit

		Credit Hours		Contact
☐ Undergrad only	☒ All Credit types	Min	Max	Hrs/Wk 3
☐ Rackham Grad	☐ Rckhm Grad w/add'l Work			
☐ Non-Rckhm Grad				Number
☐ Ugrad or Rckhm Grad		3	3	of Wks term
☐ Ugrad or Non-Rckhm Grad				

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

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

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

Terms & Freq. of Offering: ■ I ☐ II ☐ IIIa ☐ IIIb ☐ III

■ Yearly ☐ Alter Years ☐ Even Years ☐ Odd Years

Half term ☐ 1st ☐ 2nd

Cognizant Faculty Member: Alec Gallimore 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. _____ Iain Boyd, Aerospace Eng
Cross-listed Dept(s). _____

10

SUPPORTING STATEMENT

Over the past twenty years, Electric Propulsion (EP) has transitioned from a spacecraft propulsion concept of the future to an enabling technology for humankind's space enterprise. EP represents the largest segment of the annual Joint Propulsion Conference, which is the world's largest dedicated to propulsion. Over one-hundred and fifty spacecraft (mostly communication satellites) now use some form of EP. EP's utility comes from the fact that by using spacecraft power to energize and accelerate propellant instead of relying on combustion, as does a conventional rocket motor, EP devices generate thrust at considerably higher exhaust velocities than chemical rockets. EP's higher exhaust velocity (typically an order of magnitude greater) means that a spacecraft can complete a given mission using far less propellant or be accelerated to much greater speeds than is possible with chemical propulsion. The former means that a satellite can be made lighter or for the same mass, more capable (i.e., replace propellant with more payload), while the latter means that probes (and eventually people) can be sent to distant destinations quicker or can embark on missions not possible or practical with chemical propulsion; e.g., comet sample return mission.

A large fraction of future scientific, commercial, and military spacecraft will use some form of EP. EP represents one of the largest growth industries in aerospace engineering and is one of the most popular subjects among engineering students across the nation. Industry and the government need students who are knowledgeable about EP.

Our propulsion curriculum currently consists of Aero 335 (undergraduate air-breathing and rocket propulsion), Aero 530 (graduate air-breathing propulsion), and Aero 535 (graduate rocket propulsion). Aero students have often taken NERS 490, which is an advanced fusion space propulsion course that is taught by *Emeritus* Professor Terry Kammash. Aero 536 (EP) represents the next logical progression in Aero's propulsion curriculum and fills in the gap between Aero 535 and NERS 490.

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

Detail the Special requirements

11

Aero 536: Electric Propulsion

COURSE #: 536	COURSE TITLE: ELECTRIC PROPULSION
TERMS OFFERED: Fall	PREREQUISITES: Aero 335, Senior Standing
INSTRUCTOR(S): Gallimore	SCIENCE/DESIGN: 3/0
CATALOG DESCRIPTION: Introduction to electric propulsion with an overview of electricity and magnetism, atomic physics, non-equilibrium flows and electrothermal, electromagnetic, and electrostatic electric propulsion systems.	COURSE TOPICS: 1. Basic orbital mechanics and astrodynamics 2. Electricity and magnetism 3. Atomic and ionization physics 4. Kinetic theory and non-equilibrium flows 5. Arc/discharge and plasma physics 6. Electrothermal propulsion (resistojets, arcjets, & inductively-heated engines) 7. Electromagnetic propulsion (PPTs & MPDTs) 8. Electrostatic propulsion (Hall thrusters, ion engines, colloid accelerators, & FEEP)

COURSE OBJECTIVES*	1. Review the aspects of electricity and magnetism that are most relevant to electric propulsion (EP) 2. Introduce students to the basics of atomic physics as it pertains to EP 3. Introduce students to the basics of kinetic theory and non-equilibrium flows as they pertain to EP 4. Introduce students to the basics of plasma physics as it pertains to EP 5. Equip students with a general knowledge of EP systems and the tools needed to perform trades to match EP devices with mission requirements 6. Familiarize students with the concept of electrothermal propulsion and the fundamentals, design, and performance characteristics of resistojets, arcjets, and microwave/ECR (electron cyclotron resonance) thrusters 7. Familiarize students with the concept of electromagnetic propulsion and the fundamentals, design, and performance characteristics of pulsed plasma thrusters (PPTs) and magnetoplasmadynamic (MPD) thrusters 8. Familiarize students with the concept of electrostatic propulsion and the fundamentals, design, and performance characteristics of Hall thrusters, ion thrusters, colloid thrusters, and field emission electric propulsion (FEEP) systems
COURSE OUTCOMES*	On completion of Aero 536, students can: 1. Have a basic understanding of the concept of electric propulsion (EP) and which missions benefit most from it 2. Have a basic understanding of plasma physics, atomic physics, arc/discharge physics, and non-equilibrium flows as they relate to EP 3. Have an ability to use basic physics to analyze EP devices 4. Know the basic operating principles of most EP devices 5. Know the performance characteristics and basic interface requirements of most EP devices 6. Match mission requirements and constraints to EP devices

ASSESSMENT TOOLS	1. Written homework assignments 2. Mid term exam 3. Final exam

Approved by Aero faculty: February 4, 2003

AERO 536
ELECTRIC PROPULSION
FALL TERM, 2003
Class Time & Place: Tuesdays & Thursdays, 1:30–3:00 PM, 1012 FXB
Professor Alec D. Gallimore
3037 FXB - 764-8224
alec.gallimore@umich.edu
Office Hours: Mondays & Wednesdays, 1:30–3:00 PM

COURSE OUTLINE

1. Introduction to and Survey of Electric Propulsion Systems ($\sim$1 week)

2. Electricity and Magnetism, & Charged Particles ($\sim$2 weeks)

3. Kinetic Theory, Ionization of Gases, & Plasma Physics ($\sim$3 weeks)

4. Electrothermal Propulsion ($\sim$2 weeks)

   - Resistojets
   - Electrical Discharges
   - Arcjets
   - μwave & ECR Thrusters

5. Electromagnetic Propulsion ($\sim$2 weeks)

   - The Lorentz Force
   - Magnetoplasmadynamic (MPD) Thrusters
   - Pulsed Plasma Thrusters (PPTs)

6. Electrostatic Propulsion ($\sim$4 weeks)

   - Hall Thrusters
   - Ion Engines
   - Field Emission Electric Propulsion (FEEP) (*if time permits*)
   - Colloid Thrusters (*if time permits*)

COURSE GRADING SCHEME & *TENTATIVE* DUE DATES

One (1) mid-term exam (on 10/18 in class)   25%

Seven (7) homework assignments   35%
(due on 9/20, 10/2, 10/11, 10/25, 11/8, 11/20, & 12/6)

Two-hour final exam (on 12/21, 1:30–3:30 PM)   40%

ADDITIONAL COMMENTS

- Course reading material will consist of a coursepack containing the following sources:

  1. **Physics of Electric Propulsion** by R. G. Jahn, McGraw-Hill *Entire Book*

  2. **Introduction to Plasma Physics and Controlled Fusion** by F. F. Chen, Plenum *Chapters 1–3*

  3. **Electricity and Magnetism** by E. M. Purcell, McGraw-Hill *Chapters 1–3*

  4. **Introduction to Physical Gas Dynamics** by W. G. Vincenti & C. H. Kruger, Jr. *Chapters 1–2*

- All assignments are due at the beginning of class. There is a **10% per day penalty for late assignments,** *late being defined as not given in by the start of class.*

- If you cannot make my office hours, please feel free to come by my office at any time if you have questions. I maintain an "open-door" policy.

- I will try to use the internet as often as possible to distribute assignments and solutions.

Course Approval Request Form

Return to: The Office of the Registrar, 1553 LSA 1382 LSA, 763-2113

Action Requested	Date of Submission:	11/6/2002
✳ New Course	Effective Term:	W03
☐ Modification of Existing Course		
☐ Deletion of Existing Course		

Current Listing		Requested Listing		
✳ Department(s)	Subject (Division) Numbers	Department(s) (Owners)	Subject:	Catalog Number(s)
		Kinesiology	KINESLGY	533

✳ Is the Course Cross-Listed with Other Department(s)?			Is the Course Cross-Listed with Other Department?		
Department(s) (Owners)	Subject:	Catalog Number(s)	Department(s) (Owners)	Subject:	Catalog Number(s)
			Biomedical Engineering	BME	533

✳ Title Abbreviations	Course Title
	Transcript Description: (20 char)
	Neuromechanics
	Time Schedule Description: (19 char)
	Neuromechanics

✳ Course Description Narrative:	Course Description Narrative:
	This course focuses on interactions of the nervous and musculoskeletal systems during human and animal movement with a focus on basic biological and engineering principles. Topics will include neuromechanical control of movement, neurorehabilitation, biorobotics, and computer simulations of neuromechanical systems. No previous knowledge of neuroscience or mechanics is assumed.

✳ Does this course have any advisory pre-requisites?
Graduate status

✳ Does this course fill any Degree Requirements? (e.g. Race or Ethnicity)
No

Course Component(s): (Check all that are appropriate)			
What Class Types are Included in this Course?	**Which type is the graded type?**	**What type of grading scheme is used?**	**Class Location:**
X Lecture	☑	☑ Graded (A-E)	✱ Ann Arbor Campus
☐ Seminar	☐	☐ Credit/No Credit	☐ Biological Station
☐ Recitation	☐	☐ Satisfactory/Unsatisf.	☐ Camp Davis
☐ Lab	☐	☐ Pass/Fail	☐ Extension
☐ Discussion	☐	☐ Other _____	
☐ Independent Study	☐		
☐ Other _____	☐		

Course Credit Type:

☐ Undergraduate   ☐ Undergraduate Or Non-Rackham Graduate

✱ Rackham Graduate   ☐ All Credit Types

☐ Non-Rackham Graduate   ☐ Rackham Graduate Credit with Additional Work

☐ Undergraduate or Rackham Graduate

Credit Hours:

	Undergrad		Grad (Rackham)		Half Term:	Undergrad		Grad (Rackham)	
	Min	Max	Min	Max		Min	Max	Min	Max
Full Term	—	—	_3_	_3_		—	—	—	—

Repeatability:

Is the course repeatable?   ☐ Yes   ☑ No

Is the course repeatable for credit?   ☐ Yes   ☑ No

If yes, enter maximum times the course can be elected: _____

If yes, enter maximum hours to be taken for credit: _____

Can this course be taken more than once in the same term?   ☐ Yes   ☐ No

Course Information (General):

Print the course in school/college catalogs?   X Yes

Print the course in the Time Schedule?   X Yes

Print the course instructor in the Time Schedule?   X Yes

Use Blind Grading (Law Only)?   ☐ Yes

Instructor Name: ____Dan Ferris____   Instructor Title: _____Asst. Professor_____

Approval:

✱ Indefinite   cc: _____   Date: _____

☐ For one term only

cc: _____   Date: _____

Rack: _____   Date: _____

Approval of Department Chair(s);

Name: _Pat Van Volkinburg_   Date: 11-6-02

Name: _Matthew Beal_   Date: 11-10-02

Name: _____   Date: _____

18

COURSE ANNOUNCEMENT: KIN 530 (fall 2001)

Neuromechanics

This course focuses on interactions of the nervous and musculoskeletal systems during animal movement. Course material will include neural control of human movement, biological cybernetics, computer simulations of neuromechanical systems, and rehabilitation robotics. The three hour class will consist of MS PowerPoint lectures covering background material and critical analyses of current research. There is no required textbook for the class (Neuromechanics of Human Movement by Roger Enoka, 2001, is optional).

Instructor: Dan Ferris, Ph.D.
http://www-personal.umich.edu/~ferrisdp/
CCRB
ferrisdp@umich.edu

Credit Hours 3.0
Wednesdays from 6-9PM in 3733

Registration Code 18601
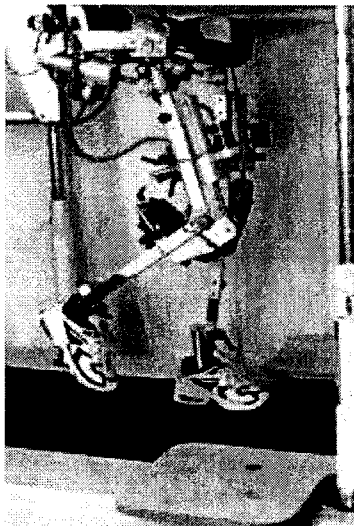
Specific topics to be covered:
Muscle mechanics
Biological Sensors
CNS Planning of Movement
Neural Oscillators
Legged Locomotion
NeuroRehabilitation
Rehabilitation Robotics
Computer Simulations
Robotic Exoskeletons

KIN 530 SEM BIOMECHANICS (Neuromechanics)   **SYLLABUS** (Fall 2001)
Credit Hours 3.0
Registration Code 18601
Wednesdays from 6-9 PM in 3733 CCRB
Instructor: Dan Ferris, Ph.D.
Office Hours: Wednesday 4-6 PM
Office Location: 3060D CCRB

This course focuses on interactions of the nervous and musculoskeletal systems during animal movement. Topics will include neural control of human movement, neurorehabilitation, rehabilitation robotics, and computer simulations of neuromechanical systems. Background material on topics will be presented each week in a lecture/open discussion format led by the instructor. Key research papers related to the topics will also be discussed.

Optional Textbook
Neuromechanics of Human Movement (2001) R. Enoka
        This book is a good primer of biomechanics and neurophysiology for those wishing more of a background in either area.

List of books on reserve at Taubman Medical Library
Neuromechanics of Human Movement (2001) R. Enoka
Multiple Muscle Systems (1990) J. Winters and S. Woo
Biomechanics and Neural Control of Posture and Movement (2000) J. Winters and P. Crago
Biological Neural Networks in Invertebrate Neuroethology and Robotics (1993) R.D. Beer, T. McKenna, and R. Ritzmann
Neurons, Networks, and Motor Behavior (1997) P.S.G. Stein, S. Grillner, A. Selverston, and D. Stuart
Robo Sapiens: Evolution of a New Species (2000) P. Menzel and C.C. Mann
Nonlinear Dynamics and Chaos (1994) S.H. Strogatz
Spikes, Decisions, and Actions (1999) H.R. Wilson
Physiological Control Systems (2000) M.C.K. Khoo
Dynamic Modeling in the Health Sciences (1998) J.L. Hargrove
Mastering Simulink 4 (2001) J. Dabney and T. Harmon
There is a 3-day loan period on each of these books.

Grading
Class participation in discussions	33%
Biweekly homework assignments	33%
Project	34%

Biweekly homework assignments (to be completed in any order)
1. Choose a chapter from Multiple Muscle Systems (1990) and write a 1-3 page report summarizing the chapter or an aspect you found particularly interesting.
2. Choose a chapter from Biomechanics and Neural Control of Posture and Movement (2000) and write a 1-3 page report summarizing the chapter or an aspect you found particularly interesting.
3. Choose a chapter from Biological Neural Networks in Invertebrate Neuroethology and Robotics (1993) and write a 1-3 page report summarizing the chapter or an aspect you found particularly interesting.

4. Choose a chapter from Neurons, Networks, and Motor Behavior (1997) and write a 1-3 page report summarizing the chapter or an aspect you found particularly interesting.
5. Choose a section from Robo Sapiens: Evolution of a New Species (2000) and write a 1-3 page report summarizing the chapter or an aspect you found particularly interesting.
6. Choose one of the following books on modeling and write a 1-3 page book review on it: Nonlinear Dynamics and Chaos (1994); Spikes, Decisions, and Actions (1999); Physiological Control Systems (2000); Dynamic Modeling in the Health Sciences (1998); or Mastering Simulink 4 (2001).
7. Choose one of laboratories listed under the Interesting Links section of the UM HNL web page (http://www-personal.umich.edu/~ferrisdp/UMHNL.html). Complete the LAB WORKSHEET that can be downloaded from the KIN 530 UM Course Tools page (https://coursetools.ummu.umich.edu/).

Class project
The class project will consist of one of the following options: 1) build a computer model to simulate a neuromechanical system, test stated hypotheses about the behavior of the system, and prepare a 6 page research report on the results (using the format for IEEE meeting papers), 2) design and conduct an experiment on neuromechanical control of human/animal movement that tests stated hypotheses about neuromechanical control and prepare a 6 page research report on the results (using the format for IEEE meeting papers), 3) research a topic about neuromechanics and prepare an NIH F32 NRSA post-doctoral fellowship application.

TOPICS AND PAPERS TO BE COVERED

Muscle mechanics
Review: Dickinson MH, Farley CT, Full RJ, Koehl MA, Kram R, Lehman S. How animals move: an integrative view. Science. 2000 Apr 7;288(5463):100-6.

Huijing, P.A.J.B.M. (2000). Length, shortening velocity, activation and fatique are not independent factors determining muscle force exerted. In J.M. Winters & P.E. Crago (Eds.), Biomechanics and neural control of posture and movement. (pp. 83-90). New York: Springer-Verlag.

Riewald SA, Delp SL. The action of the rectus femoris muscle following distal tendon transfer: does it generate knee flexion moment? Dev Med Child Neurol. 1997 Feb;39(2):99-105.

Gerritsen KG, van den Bogert AJ, Hulliger M, Zernicke RF. Intrinsic muscle properties facilitate locomotor control - a computer simulation study. Motor Control. 1998 Jul;2(3):206-20.

Biological Sensors
Review: Bosco G, Poppele RE. Proprioception from a spinocerebellar perspective. Physiol Rev. 2001 Apr;81(2):539-68.

Rothwell JC, Traub MM, Day BL, Obeso JA, Thomas PK, Marsden CD. Manual motor performance in a deafferented man. Brain. 1982 Sep;105 (Pt 3):515-42.

Eng JJ, Hoffer JA. Regional variability of stretch reflex amplitude in the cat medial gastrocnemius muscle during a postural task. J Neurophysiol. 1997 Aug;78(2):1150-4.

Bouyer LJ, Rossignol S. The contribution of cutaneous inputs to locomotion in the intact and the spinal cat. Ann N Y Acad Sci. 1998 Nov 16;860:508-12.

Bosco G, Poppele RE, Eian J. Reference frames for spinal proprioception: limb endpoint based or joint-level based? J Neurophysiol. 2000 May;83(5):2931-45.

CNS Planning of Movement

Review: Loeb GE. What might the brain know about muscles, limbs and spinal circuits? Prog Brain Res. 1999;123:405-9.

Shadmehr R, Mussa-Ivaldi FA. Adaptive representation of dynamics during learning of a motor task. J Neurosci. 1994 May;14(5 Pt 2):3208-24.

Takahashi CD, Scheidt RA, Reinkensmeyer DJ. Impedance control and internal model formation when reaching in a randomly varying dynamical environment. J Neurophysiol. 2001 Aug;86(2):1047-51.

Zaal FT, Daigle K, Gottlieb GL, Thelen E. An unlearned principle for controlling natural movements. J Neurophysiol. 1999 Jul;82(1):255-9.

Neural Oscillators

Review: Marder E, Calabrese RL. Principles of rhythmic motor pattern generation. Physiol Rev. 1996 Jul;76(3):687-717.

McClellan AD, Sigvardt KA. Features of entrainment of spinal pattern generators for locomotor activity in the lamprey spinal cord. J Neurosci. 1988 Jan;8(1):133-45.

Grillner S, Rossignol S. On the initiation of the swing phase of locomotion in chronic spinal cats. Brain Res. 1978 May 12;146(2):269-77.

Viala D, Viala G and Fayein N (1986) Plasticity of locomotor organization in infant rabbits spinalized shortly after birth. Development and Plasticity of the Mammalian Spinal Cord. ME Goldberger, A Gorio and M Murray, Eds. Padova, Liviana Press, 301-310.

M. Williamson, "Neural control of rhythmic arm movements," Neural Networks, vol. 11, pp. 1379-1394, 1998.

Legged Locomotion

Review: Alexander, R. M. (1995). Simple models of human movement. Appl Mech Rev 48, 461-469.

Collins, SH, Wisse, M, Ruina, A. A 3-D passive-dynamic walking robot with two legs and knees. International Journal of Robotics Research, In press.

Ferris DP, Liang K, Farley CT. Runners adjust leg stiffness for their first step on a new running surface. J Biomech. 1999 Aug;32(8):787-94.

Raibert and Hodgkins. (1993). Legged robots. In Biological Neural Networks in Invertebrate Neuroethology and Robotics, (ed. R. Beer, R. Ritzmann and T. McKenna), pp. 319-354. Boston: Academic Press.

G.A. Pratt. Legged Robots at MIT: What's New Since Raibert, IEEE Robotics and Automation Magazine, pp. 15-19, September 2000.

Phase Transitions

Review: Hanna, A., Neal., R.J., Burgess-Limerick, R., & Abernethy, B. (2000). Chapter 5. Triggers for the transition between human walking and running. In W.A. Sparrow (Ed.). Energetics of Human Activity. Champaign II: Human Kinetics.

Kram R, Domingo A, Ferris DP. Effect of reduced gravity on the preferred walk-run transition speed. J Exp Biol. 1997, 200:821-826.

Prilutsky BI, Gregor RJ. Swing- and support-related muscle actions differentially trigger human walk-run and run-walk transitions. J Exp Biol. 2001 Jul;204(Pt 13):2277-87.

Riek S, Carson RG. Let your feet do the walking: constraints on the stability of bipedal coordination. Exp Brain Res. 2001 Feb;136(3):407-12.

NeuroRehabilitation
Review: Macdonell RA, Dewey HM. Neurological disability and neurological rehabilitation. Med J Aust. 2001 Jun 18;174(12):653-8.

Taub E, Morris DM. Constraint-induced movement therapy to enhance recovery after stroke. Curr Atheroscler Rep. 2001 Jul;3(4):279-86.

Wernig A, Nanassy A, Muller S. Laufband (LB) therapy in spinal cord lesioned persons. Prog Brain Res. 2000;128:89-97.

Weiss A, Suzuki T, Bean J, Fielding RA. High intensity strength training improves strength and functional performance after stroke. Am J Phys Med Rehabil. 2000 Jul-Aug;79(4):369-76

MacPhail HE, Kramer JF. Effect of isokinetic strength-training on functional ability and walking efficiency in adolescents with cerebral palsy. Dev Med Child Neurol. 1995 Sep;37(9):763-75.

Rehabilitation Robotics
Review: Hogan N. Rehabilitation applications of robotic technology. J Rehabil Res Dev. 2000 Nov-Dec;37(6):ix-x.

Colombo G, Joerg M, Schreier R, Dietz V. Treadmill training of paraplegic patients using a robotic orthosis. J Rehabil Res Dev. 2000 Nov-Dec;37(6):693-700.

Krebs HI, Volpe BT, Aisen ML, Hogan N. Increasing productivity and quality of care: robot-aided neuro-rehabilitation. J Rehabil Res Dev. 2000 Nov-Dec;37(6):639-52.

Reinkensmeyer DJ, Kahn LE, Averbuch M, McKenna-Cole A, Schmit BD, Rymer WZ. Understanding and treating arm movement impairment after chronic brain injury: progress with the ARM guide. J Rehabil Res Dev. 2000 Nov-Dec;37(6):653-62.

Burgar CG, Lum PS, Shor PC, Machiel Van der Loos HF. Development of robots for rehabilitation therapy: the Palo Alto VA/Stanford experience. J Rehabil Res Dev. 2000 Nov-Dec;37(6):663-73.

Neuromechanical Computer Simulations
Review: Crago, P. (2001) Creating neuro-musculoskeletal models. In J.M. Winters & P.E. Crago (Eds.), Biomechanics and neural control of posture and movement. New York: Springer-Verlag.

Hatsopoulos NG. Coupling the neural and physical dynamics in rhythmic movements. Neural Comput. 1996 Apr 1;8(3):567-81.

Taga G, Yamaguchi Y, Shimizu H. Self-organized control of bipedal locomotion by neural oscillators in unpredictable environment. Biol Cybern. 1991;65(3):147-59.

Hidler JM, Rymer WZ. A simulation study of reflex instability in spasticity: origins of clonus. IEEE Trans Rehabil Eng. 1999 Sep;7(3):327-40.

Ekeberg O, Grillner S. Simulations of neuromuscular control in lamprey swimming. Philos Trans R Soc Lond B Biol Sci. 1999 May 29;354(1385):895-902.

Robotic Exoskeletons
Review: Harwin WS. Robots with a gentle touch: advances in assistive robotics and prosthetics. Technol Health Care. 1999;7(6):411-417.

H. Kazerooni. Human Power Extender: An example of human-machine interaction via the transfer of power and information signals, 5th International Workshop on Advanced Motion Control. Proceedings, 1988, p.565-572

Rosen J. Brand M. Fuchs MB. Arcan M. A myosignal-based powered exoskeleton system. IEEE Transactions on Systems, Man, & Cybernetics Part A: Systems & Humans, 2001 May 31(3):210-222.

Ruthenberg BJ, Wasylewski NA, Beard JE (1997) An experimental device for investigating the force and power requirements of a powered gait orthosis. J Rehab Res Dev 34:203-213.

http://www.darpa.mil/DSO/thrust/md/Exoskeletons/

Dan Ferris, Ph.D.
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Division of Kinesiology
University of Michigan
401 Washtenaw Avenue
Ann Arbor, MI 48109-2214

e-mail: ferrisdp@umich.edu
Phone: (734) 647-6878
Fax: (734) 936-1925
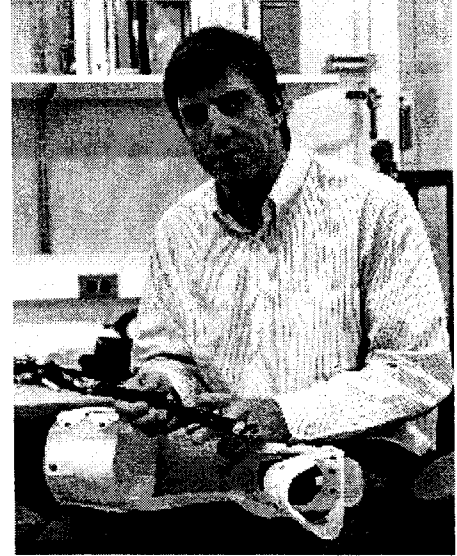
● Research Interests

Neuromechanical control of movement
Gait rehabilitation
Biorobotics
Motor adaptation to reduced gravity

Dr. Ferris is a biomechanist whose research focuses on how the nervous system and musculoskeletal system interact to produce coordinated movement. Using a combination of techniques from engineering mechanics, neurophysiology, and non-linear dynamics, he studies both basic science and applied health issues. Some of the fundamental questions his research addresses include:

How flexible are the neural networks that control human locomotion?
Do the brain and spinal cord let the natural dynamics of the limbs determine movement patterns?
Can we use robotic exoskeletons to improve gait rehabilitation after spinal cord injury or stroke?

The common goal of his research is to discover general principles of locomotor control and apply them to improve human health.

Prof. Ferris directs the Human Neuromechanics Laboratory. Projects in

the laboratory include designing pneumatically powered lower limb exoskeletons, constructing computer simulations of neuromechanical systems, and studying human motor adaptation to locomotion under simulated reduced gravity.

● Education

B.S., Mathematics Education, University of Central Florida, Orlando, FL.
M.S., Exercise Physiology, University of Miami, Florida.
Ph.D., Human Biodynamics, University of California, Berkeley, CA.
Post-doc, Neurophysiology, University of California, Los Angeles, CA.
Post-doc, Bioengineering, University of Washington, Seattle, WA.

Prof. Ferris' cross-disciplinary approach to scientific research is reflected in his diverse academic background. He completed his doctoral studies in biomechanics at UC Berkeley and has served as a post-doctoral researcher in the UCLA Department of Neurology and the University of Washington Department of Electrical Engineering. While at UCLA, Dr. Ferris worked on clinical research testing new rehabilitation techniques for individuals with spinal cord injuries. Patients were supported in modified parachute harnesses while physical therapists helped move their limbs on a treadmill. He later moved to Washington in order to begin work on robotic devices to assist this type of locomotor rehabilitation

● Teaching

Prof. Ferris teaches an undergraduate class in Biomechanics of Human Movement (MVS 330) and a graduate class on Neuromechanics (KIN 530)

● Grants and Publications

Prof. Ferris has received grants from the National Institutes of Health, NASA, and the Christopher Reeve Paralysis Foundation. He has published in the *Journal of Physiology, Proceedings of the Royal Society of London Biological Sciences, Journal of Experimental Biology, Journal of Applied Physiology, Exercise and Sport Sciences Reviews,* and

Journal of Biomechanics

Full Curriculum Vitae

USEFUL LINKS

This page was last updated on 6/3/2002.

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

Print

Form Number

9 8 3

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 10/8/2002

Effective Fall 03

A. CURRENT LISTING

Home Department		Div #	Course Number

Cross Listed Course Information

Course Title

TITLE ABBRE-VIATION	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

[X] Prerequisites

○ Enforced ○ Advised

Credit Restrictions

[X] 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		Contact
Min	Max	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

[X] Class Type(s) ⊠ Lec   Graded ◉ Lec   Grading
□ Rec   Section ○ Rec
□ Sem   ○ Sem   ⊠ A-E
□ Lab   ○ Lab   □ CR/NC
□ Dis   ○ Dis   □ S/U
□ Ind   ○ Ind   □ P/F
□ Other ____   ○ Other _ □ Y

Location
⊠ Ann Arbor
□ Biological Station
□ Camp Davis
□ Extension

B. REQUESTED LISTING

Home Department	Div #	Course Number
Biomedical Engineering	242	556

Cross Listed Course Information

Course Title
Molecular and Cellular Biomechanics

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	Mole & Cell Biomech
	Transcript Max = 20 Spaces	Mole & Cell Biomech

Course Description for Official Publication (Max = 50 words)
This course will focus on how biomechanical and biophysical properties of subcellular structures can be determined and interpreted to reveal the workings of biological nano-machines.

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 Senior 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		Contact
Min	Max	Hrs/Wk 3
3	3	Number of Wks 14

Printing Information   ⊠ Print the course in the Bulletin
(Optional)   ⊠ 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: ____ Alan J. Hunt ____   Title Assistant 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. Matthew O'Donnell, Chair, Biomedical Engineering
Cross-listed Dept(s). _____

28

SUPPORTING STATEMENT

BiomedE 556 is a very advanced capstone course most appropriately taken by students near the end of their undergraduate studies.

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

Detail the Special requirements

Form Number

1069

Print

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 2/21/2003

Effective Fall 2003

A. CURRENT LISTING

Home Department	Div #	Course Number

Cross Listed Course Information

Course Title

TITLE ABBRE- VIATION	Time Sched Max = 19 Spaces	
	Transcript Max = 20 Spaces	

Course Description

B. REQUESTED LISTING

Home Department	Div #	Course Number
Chemical Engineering	245	487

Cross Listed Course Information

Course Title
Process Simulation and Design

TITLE ABBRE- VIATION	Time Sched Max = 19 Spaces	Proc Sim & Des
	Transcript Max = 20 Spaces	PROC SM/DS

Course Description for Official Publication (Max = 50 words)
Process synthesis and design. Conceptual process design. Equipment sizing and cost estimation. Process and corporate economics. Safety, environmental and ethical issues. Process simulation with computer assistance. Design project with oral and technical reports. Technical communications.

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 MSE 250, preceded or accompanied by ChemE 344
○ 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		Contact Hrs/Wk
Min	Max	
		Number of Wks

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 ChE 360, MSE 250, preceded or accompanied by ChE 344
○ 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		Contact Hrs/Wk 5
Min	Max	
4	4	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

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

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

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

Half term ☐ 1st ☐ 2nd

Cognizant Faculty Member: Phillip Savage Title Professor
Susan Montgomery Lecturer

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

Submitted By: ■ Home Dept. ☑ Cross-listed Dept
Name, Signature & Department
Home Dept. _____ Ronald Larson, Chemical Engineering

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

Cross-listed Dept(s). _____

30

☐ Cross listed Unit 2 ——————————— ···

SUPPORTING STATEMENT

ChE 360 and ChE 487 are the 1st and 3rd courses in our communications through the curriculum course, and students who take them concurrently are not adequately prepared for the writing required in ChE 487.

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
1060

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 2/13/2003
Effective Winter 2004

A. CURRENT LISTING

Home Department		Div #	Course Number

Cross Listed Course Information

Course Title

| TITLE ABBRE-VIATION | Time Sched Max = 19 Spaces | |
| | Transcript Max = 20 Spaces | |

Course Description

B. REQUESTED LISTING

Home Department	Div #	Course Number
Civil and Environmental Engineering	248	522

Cross Listed Course Information

Course Title
Sediment Transport

| TITLE ABBRE-VIATION | Time Sched Max = 19 Spaces | Sediment Transport |
| | Transcript Max = 20 Spaces | Sediment Transport |

Course Description for Official Publication (Max = 50 words)
Mechanics of sediment transport processes in fluvial systems; Initiation of Motion; Bed forms; Resistance to flow; Suspended sediment transport; Bed load transport; Cohesive sediments; Geomorphology principles

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

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

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

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

Prerequisites
○ Enforced ○ Advised

Prerequisites CEE 325 or equivalent
◉ Enforced ○ Advised

Credit Restrictions

Credit Restrictions

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

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

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

Credit Hours		Contact
Min	Max	Hrs/Wk 3
3	3	Number
		of Wks 15

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

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

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

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

Cognizant Faculty Member: Steven J. Wright **Title** Professor

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

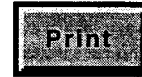**Approval**

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

Submitted By: ☒ Home Dept ☒ Cross-listed Dept
Name, Signature & Department
Home Dept. Civil and Environmental Engineering
Cross-listed Dept(s). _____

32

SUPPORTING STATEMENT

Attached is a syllabus from the Winter Term 2002 when the proposed course was offered as an independent study. Approximately 11 students including audits attended the course. The general material in the course has been taught several times previously for one or two students as an independent study also. It is felt that there will be sufficient interest in the course for it to be offered on an alternate year basis. This subject is of considerable interest in the Civil Engineering, Hydraulics area but remediation of contaminated sediments is also a topical area in Environmental Engineering. Although the course does not focus on water quality aspects of the subject, a key issue with regards to contaminated sediments is deposition, resuspension and transport and those topics are included in the course material.

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

Detail the Special requirements

CEE 622 SEDIMENT TRANSPORT
S.J. WRIGHT, EWRE, 764-7148 sjwright@engin.umich.edu
Textbook - Sediment Transport, Theory and Practice, C.T. Yang
Course Grade Based on 50% Assignments, 50% Final Exam

Tentative Schedule

Date		Subject	Reading
Jan.	7	Introduction	
	9	Sediment Properties	Ch. 1
	11	fall velocity	
	14	Cohesive Sediment - coagulation	
	16	Incipient Motion- noncohesive sediment	19-30
	18		
	23	Armoring	35-40
	25	Cohesive sediments	
	28	Resistance to Flow - Rigid Boundary mechanics review	51-60
	30		
Feb.	1	Bed forms, classification	60-68
	4	Resistance formulations	69-86
	6		
	8		
	11	Comparison of different methods	
	13	Sediment Transport Rates, description	122-138
	15	Suspended Sediment	
	18		
	20	Bed Load Formulations	90-118
	22		
March	4		
	6	Total Load Formulations	141-193
	8		
	11		
	13	Comparison of different methods	229-237
	15	Numerical Modeling of sediment transport, equations	
	18	Numerical models	Handouts
	20	Regime formulation	
	22	Geomorphology principles	
	25		
	27		
	29		
April	1	Stream Classification Systems	
	3	Sources of Sediment - erosion formulations	
	5		
	8	Reservoir sedimentation	
	10		
	12	Sediment resuspension	
	15	Effect of Waves	
	17		

Final Examination: To be set

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

Form Number

1029

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 1/31/2003

Effective Winter 2003

A. CURRENT LISTING

Home Department	Div #	Course Number
EECS	252	467

Cross Listed Course Information		
ME	280	467
MFG	275	467

Course Title
Robotics: Theory, Design and Application

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	Robotics
	Transcript Max = 20 Spaces	Robotics

Course Description
Basic concepts underlying the design and application of computer-controlled manipulators: Manipulator geometry, work volume, sensors, feedback control of manipulator linkages, kinematics, trajectory planning, programming, robot system architecture, design and application. Lab experiments cover kinematics, dynamics, trajectory planning, control of manipulators, and motion by fixed robots and mobile robots.

B. REQUESTED LISTING

Home Department	Div #	Course Number

Cross Listed Course Information		

Course Title

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	
	Transcript Max = 20 Spaces	

Course Description for Official Publication (Max = 50 words)

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 360 and senior standing
○ Enforced ○ Advised

Credit Restrictions

Level of Credit		Credit Hours		Contact
☐ Undergrad only ☐ All Credit types		Min	Max	Hrs/Wk 6
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work				
☐ Non-Rckhm Grad		3	3	Number
☒ Ugrad or Rckhm Grad				of Wks 14
☐ Ugrad or Non-Rckhm Grad				

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		Credit Hours		Contact
☐ Undergrad only ☐ All Credit types		Min	Max	Hrs/Wk
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work				
☐ Non-Rckhm Grad				Number
☐ Ugrad or Rckhm Grad				of Wks
☐ Ugrad or Non-Rckhm Grad				

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

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

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

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

Half term ☐ 1st ☐ 2nd

Cognizant Faculty Member:	Lynn Conway	Title Professor
	Yoram Koren	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. Jeff Fessler EECS *Jeff Tessler* 2003-1-31
Cross-listed Dept(s). *Greg Hulbert ME*

SUPPORTING STATEMENT

We are deleting the course because it has not been offered for some time and we feel it is misleading to students to leave it on the books. We are submitting this again, the paper work for 467 was never completed.

Approved by EECS Fac in 2001

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
1029

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 1/31/2003

Effective Winter 2003

A. CURRENT LISTING

Home Department	Div #	Course Number
EECS	252	467

Cross Listed Course Information		
ME	280	467
MFG	275	467

Course Title
Robotics: Theory, Design and Application

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	Robotics
	Transcript Max = 20 Spaces	Robotics

Course Description
Basic concepts underlying the design and application of computer-controlled manipulators: Manipulator geometry, work volume, sensors, feedback control of manipulator linkages, kinematics, trajectory planning, programming, robot system architecture, design and application. Lab experiments cover kinematics, dynamics, trajectory planning, control of manipulators, and motion by fixed robots and mobile robots.

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 360 and senior standing
○ Enforced ○ Advised

Credit Restrictions

Level of Credit		Credit Hours		Contact
□ Undergrad only □ All Credit types		Min	Max	Hrs/Wk 6
□ Rackham Grad □ Rckhm Grad w/add'l Work				
□ Non-Rckhm Grad		3	3	Number
☒ Ugrad or Rckhm Grad				of Wks 14
□ Ugrad or Non-Rckhm Grad				

B. REQUESTED LISTING

Home Department	Div #	Course Number

Cross Listed Course Information		

Course Title

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	
	Transcript Max = 20 Spaces	

Course Description for Official Publication (Max = 50 words)

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		Credit Hours		Contact
□ Undergrad only □ All Credit types		Min	Max	Hrs/Wk ___
□ Rackham Grad □ Rckhm Grad w/add'l Work				
□ Non-Rckhm Grad				Number
□ Ugrad or Rckhm Grad				of Wks ___
□ Ugrad or Non-Rckhm Grad				

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)	Graded Section	Grading	Location
☒ Lec	◉ Lec	□ Lec	
□ Rec	○ Rec	☒ A-E	☒ Ann Arbor
□ Sem	○ Sem	□ CR/NC	□ Biological Station
☒ Lab	○ Lab	□ S/U	□ Camp Davis
□ Dis	○ Dis	□ P/F	□ Extension
□ Ind	○ Ind	□ Y	
□ Other ___	○ Other		

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

Cognizant Faculty Member:	Lynn Conway	Title Professor
	Yoram Koren	Professor

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

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

Submitted By: ■ Home Dept. □ Cross-listed Dept.
Name, Signature & Department
Home Dept. Jeff Fessler EECS   *[signature]* 2003-1-31
Cross-listed Dept(s). *Indic thu MFG* *[signature]*

Approval

□ Curriculum Comm. _____

□ Faculty _____
□ Rackham _____
□ Cross listed Unit 1 _____
□ Cross listed Unit 2 _____

SUPPORTING STATEMENT

We are deleting the course because it has not been offered for some time and we feel it is misleading to students to leave it on the books. We are submitting this again, the paper work for 467 was never completed.

Approved by EECS Fac in 2001

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
1025

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 1/29/2003

Effective_____

A. CURRENT LISTING

Home Department	Div #	Course Number
EECS	252	568

Cross Listed Course Information		
MFG	275	570

Course Title
Process Control for Microelectronics Manufacturing

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	Proc Cont Micr Mfg
	Transcript Max = 20 Spaces	Cont Micr Mfg

Course Description
Selected processing steps in micrelectronics manufacturing, design of experiments, process and substrate sensors, statistical process control, run-to-run control, real-time control, failure diagnostics, computer implementation of control systems.

B. REQUESTED LISTING

Home Department	Div #	Course Number

Cross Listed Course Information		

Course Title

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	
	Transcript Max = 20 Spaces	

Course Description for Official Publication (Max = 50 words)

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	Credit Hours	Contact
□ Undergrad only ☐ All Credit types	Min Max	Hrs/Wk __3__
☒ Rackham Grad ☐ Rckhm Grad w/add'l Work		
□ Non-Rckhm Grad	_3_ _3_	Number
□ Ugrad or Rckhm Grad		of Wks __14__
□ Ugrad or Non-Rckhm Grad		

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	Credit Hours	Contact
□ Undergrad only ☐ All Credit types	Min Max	Hrs/Wk ____
□ Rackham Grad ☐ Rckhm Grad w/add'l Work		
□ Non-Rckhm Grad	___ ___	Number
□ Ugrad or Rckhm Grad		of Wks ___
□ Ugrad or Non-Rckhm Grad		

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

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

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

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

Half term □ 1st
□ 2nd

Cognizant Faculty Member: _____ Title _____

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.   Jeff Fessler EECS   2003-1-30 _[signature]_
Cross-listed Dept(s). _Fall Hu MFG_ _[signature]_

39

SUPPORTING STATEMENT

"The faculty member who taught this course has left UM and it has not been taught recently."

(Approved by ECE faculty 2007-1-28)

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

Detail the Special requirements

MichiganEngineering

MEMORANDUM

DATE: February 12, 2003

TO: CoE Curriculum Committee

FROM: Materials Science & Engineering Undergraduate Committee

SUBJECT: Two Course Approval Forms for Consideration

On behalf of the Materials Science and Engineering Undergraduate Committee, I am submitting the two Course Approval Forms attached for review and approval by the College of Engineering Curriculum Committee at their next meeting.

Both forms are only modifying the courses involved:

MSE 480 was previously offered in the Fall term only, and
MSE 489 was previously offered in the Winter term only.

The forms attached are modifications to reverse the terms these courses are offered:

MSE 480 offered only in the Winter term and
MSE 489 offered only in the Fall term.

Respectfully,

Judith E. Hyde
MSE Student Services Assistant

Cc: R.E. Robertson

41

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

Form Number
1042

Print

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 2/3/2003

Effective Winter 2004

A. CURRENT LISTING

Home Department	Div #	Course Number
Materials Science & Engineering	281	480

Cross Listed Course Information		
MFG	275	480

Course Title
Materials and Engineering Design

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	MATLS ENGR DESIGN
	Transcript Max = 20 Spaces	MAT ENG DES

Course Description
Design concepts. Engineering economics. Various design criteria, processes, and process control. Materials substitution. Competitive design. Case histories. Professional and ethical considerations. Written and oral presentations of solutions to design problems.

B. REQUESTED LISTING

Home Department	Div #	Course Number
Materials Science & Engineering	281	480

Cross Listed Course Information		
MFG	275	480

Course Title
Materials and Engineering Design

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	MATLS ENGR DESIGN
	Transcript Max = 20 Spaces	MAT ENG DES

Course Description for Official Publication (Max = 50 words)
Design concepts. Engineering economics. Various design criteria, processes, and process control. Materials substitution. Competitive design. Case histories. Professional and ethical considerations. Written and oral presentations of solutions to design problems.

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

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 Senior Standing.
○ Enforced ◉ Advised

Credit Restrictions

Level of Credit		Credit Hours		Contact
☐ Undergrad only ☐ All Credit types		Min	Max	Hrs/Wk ___3___
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work				
☐ Non-Rckhm Grad		3	3	Number
☒ Ugrad or Rckhm Grad				of Wks ___14___
☐ Ugrad or Non-Rckhm Grad				

Level of Credit		Credit Hours		Contact
☐ Undergrad only ☐ All Credit types		Min	Max	Hrs/Wk ___3___
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work				
☐ Non-Rckhm Grad		3	3	Number
☒ Ugrad or Rckhm Grad				of Wks ___14___
☐ Ugrad or Non-Rckhm Grad				

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

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

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

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

Cognizant Faculty Member: A. Ghosh, J. Halloran, W. Jones   Title Professors
J. Kieffer   Assoc. 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. John W. Halloran (MS&E)
Cross-listed Dept(s). (MFG) S. Jack Hu

42

SUPPORTING STATEMENT

MSE 480 and MSE 489 are senior design courses that are required of all MSE students. The current schedule is 480 in the Fall term and 489 in the Winter term. The current sequence makes it difficult for students to take MSE 435: Kinetics and Transport in Materials Engineering before taking MSE 489, which is a process oriented design course. We therefore are requesting that the sequence of MSE 489 and MSE 480 be reversed to correct this problem.

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

Detail the Special requirements

The students will need the use of laboratory and computer facilities for design information. Most needs will be met by CAEN and department facilities. Students will have to seek off-campus resources to solve some of their problems.

Form Number

[Print]

| 1 0 4 1 |

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 2/3/2003

Effective_____

A. CURRENT LISTING

Home Department	Div #	Course Number
Materials Science & Engineering	281	489

Cross Listed Course Information		
MFG	275	489

Course Title
Materials Processing Design

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	MAT PROC DESIGN
	Transcript Max = 20 Spaces	MAT PROC DESIGN

Course Description
The design of production and refining systems for engineering materials. Design of problems for the extraction and refining of metals, production and processing of ceramics, polymeric materials, and electronic materials. Written and oral presentation of solutions to processing design problems.

B. REQUESTED LISTING

Home Department	Div #	Course Number
Materials Science & Engineering	281	489

Cross Listed Course Information		
MFG	275	489

Course Title
Materials Processing Desi

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	MAT PROC DESIGN
	Transcript Max = 20 Spaces	MAT PROC DESIGN

Course Description for Official Publication (Max = 50 words)
The design of production and refining systems for engineering materials. Design of problems for the extraction and refining of metals, production and processing of ceramics, polymeric materials, and electronic materials. Written and oral presentation of solutions to processing design problems.

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   Preceded or accompanies by MSE 430 and MSE 435
○ Enforced ⊙ Advised

Credit Restrictions

Level of Credit		Credit Hours		Contact
☐ Undergrad only ☐ All Credit types		Min	Max	Hrs/Wk 3
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work				
☐ Non-Rckhm Grad		3	3	Number
☒ Ugrad or Rckhm Grad				of Wks 14
☐ Ugrad or Non-Rckhm Grad				

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   Preceded or accompanies by MSE 430 and MSE 435
○ Enforced ⊙ Advised

Credit Restrictions

Level of Credit		Credit Hours		Contact
☐ Undergrad only ☐ All Credit types		Min	Max	Hrs/Wk 3
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work				
☐ Non-Rckhm Grad		3	3	Number
☒ Ugrad or Rckhm Grad				of Wks 14
☐ Ugrad or Non-Rckhm Grad				

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   ☒ Print the course in the Bulletin
(Optional)   ☒ 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: | J. Kieffer | Title Assoc. Professor |
| | A. Ghosh, R. Laine, T. Pollock | Professors |

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.   John W. Halloran (MS&E)
Cross-listed Dept(s).   (MFG)   S. Jack Hu

44

SUPPORTING STATEMENT

MSE 480 and MSE 489 are senior design courses that are required of all MSE students. The current schedule is 480 in the Fall term and 489 in the Winter term. The current sequence makes it difficult for students to take MSE 435: Kinetics and Transport in Materials Engineering before taking MSE 489, which is a process-oriented design course. We therefore are requesting that the sequence of MSE 489 and MSE 480 be reversed to correct this problem.

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

Detail the Special requirements

The students will need extensive use of laboratory and computer design facilities; including both hardware and software. Most needs will be met by CAEN and department facilities. Students may have to seek off-campus resources to solve some of their problems.

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

Form Number

| 1 0 4 5 |

[Print]

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 2/3/2003

Effective Spring 2003

A. CURRENT LISTING

Home Department	Div #	Course Number

Cross Listed Course Information

Course Title

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	
	Transcript Max = 20 Spaces	

Course Description

B. REQUESTED LISTING

Home Department MECHANICAL ENGINEERING	Div # 280	Course Number 235

Cross Listed Course Information

Course Title
THERMODYNAMICS I

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	THERMODYNAMICS I
	Transcript Max = 20 Spaces	THERMODYNAMICS I

Course Description for Official Publication (Max = 50 words)

Introduction to engineering thermodynamics. First law, second law system and control volume analyses; properties and behavior of pure substances; application to thermodynamic systems operating in a steady state and transient processes. Heat transfer mechanismis. Typical power producing cycles and refrigerators. Ideal gas mixtures and moist air applications.

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		Credit Hours		Contact
☐ Undergrad only ☐ All Credit types		Min	Max	Hrs/Wk
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work				
☐ Non-Rckhm Grad				Number
☐ Ugrad or Rckhm Grad				of Wks
☐ Ugrad or Non-Rckhm Grad				

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 Chem130, 125 or Chem 210, 211, and Math 116
○ Enforced ◉ Advised

Credit Restrictions

Level of Credit		Credit Hours		Contact
☒ Undergrad only ☐ All Credit types		Min	Max	Hrs/Wk 3
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work				
☐ Non-Rckhm Grad		3	3	Number
☐ Ugrad or Rckhm Grad				of Wks 14
☐ Ugrad or Non-Rckhm Grad				

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

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

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

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

Half term ☐ 1st ☐ 2nd

Cognizant Faculty Member: _____ C. Borgnakke _____ Title Assoc 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).

SUPPORTING STATEMENT

ME235 is the first in the new thermal, fluid, heat transfer sequence in the ME program. Additional supporting documentaiton for this program change is being provided to the College Curriculum Committee.

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

Detail the Special requirements

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

Form Number

| 1044 |

[Print]

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 2/3/2003

Effective Winter 2004

A. CURRENT LISTING

Home Department		Div #	Course Number

Cross Listed Course Information

Course Title

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	
	Transcript Max = 20 Spaces	

Course Description

B. REQUESTED LISTING

Home Department MECHANICAL ENGINEERING	Div # 280	Course Number 320

Cross Listed Course Information

Course Title FLUID MECHANICS I

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	FLUID MECH I
	Transcript Max = 20 Spaces	FLUID MECH I

Course Description for Official Publication (Max = 50 words)

Fluid statics; conservation of mass, momentum, and energy in fixed and moving control volumes; steady and unsteady Bernoulli's equation; differential analysis of fluid flow; dimensional analysis and similitude; laminar and turbulent flow; boundary layers; lift and drag; introduction to commercial CFD packages; applications to mechanical, biological, environmental, and micro-fluidic 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
◯ Enforced ◯ Advised

Credit Restrictions

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

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

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 ME235, ME240, and Math 216
◯ Enforced ⦿ Advised

Credit Restrictions

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

Credit Hours		Contact
Min	Max	Hrs/Wk 3
3	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)	Graded Section	Grading	Location
☒ Lec	◉ Lec		
☐ Rec	◯ Rec	☒ A-E	☒ Ann Arbor
☐ Sem	◯ Sem	☐ CR/NC	☐ Biological Station
☐ Lab	◯ Lab	☐ S/U	☐ Camp Davis
☐ Dis	◯ Dis	☐ P/F	☐ Extension
☐ Ind	◯ Ind	☐ Y	
☐ Other ___	◯ Other _		

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:	R. Akhavan	Title Assoc 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).

SUPPORTING STATEMENT

ME320 is the second course in the new thermal, fluids, heat transfer sequence in the ME program. Additional supporting documentation for this program change is being provided to the College Curriculum Committee.

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

1017

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 2/3/2003

Effective Fall 2004

A. CURRENT LISTING

Home Department		Div #	Course Number

Cross Listed Course Information

Course Title

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	
	Transcript Max = 20 Spaces	

Course Description

B. REQUESTED LISTING

Home Department	Div #	Course Number
Mechanical Engineering	280	335

Cross Listed Course Information

Course Title
Heat Transfer

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	Heat Transfer
	Transcript Max = 20 Spaces	Heat Transfer

Course Description for Official Publication (Max = 50 words)

Heat transfer by conduction, convection, radiation; heat storage, energy conversion; steady-state/transient conduction heat transfer; thermal circuit modeling; multidimensional conduction; surface radiation properties, enclosure radiation exchange; surface convection/fluid streams over objects, nondimensional numbers, laminar, turbulent, thermobuoyant flow, boiling and condensation; heat exchangers; design of thermal systems, solvers for problem solving/design.

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		Credit Hours	Contact
□ Undergrad only □ All Credit types		Min Max	Hrs/Wk
□ Rackham Grad □ Rckhm Grad w/add'l Work			
□ Non-Rckhm Grad			Number
□ Ugrad or Rckhm Grad			of Wks
□ Ugrad or Non-Rckhm Grad			

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 320
○ Enforced ⊙ Advised

Credit Restrictions

Level of Credit		Credit Hours	Contact
☒ Undergrad only □ All Credit types		Min Max	Hrs/Wk 3
□ Rackham Grad □ Rckhm Grad w/add'l Work		3 3	
□ Non-Rckhm Grad			Number
□ Ugrad or Rckhm Grad			of Wks 14
□ Ugrad or Non-Rckhm Grad			

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

Printing Information ☒ Print the course in the Bulletin
(Optional) ☒ 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: M. Kaviany 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).

Form Number

50

SUPPORTING STATEMENT

ME335 is the third course in the new thermal, fluids, heat transfer sequence in the ME program. Additional supporing documentation for this program change is being provided to the College Curriculum Committee.

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

1034

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 1/31/2003

Effective Fall 2003

A. CURRENT LISTING

Home Department	Div #	Course Number
Technical Communication	291	400

Cross Listed Course Information

Course Title
Technical Information and Communication Resources

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	Tech Info Comm
	Transcript Max = 20 Spaces	Tec Info Com

Course Description
This course provides an overview of information resurses in printed electronic and verbal form and uses the information research process to explore communication amongst scientists and engineers.

PROGRAM OUTCOMES:

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

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

Prerequisites None
○ Enforced ○ Advised

Credit Restrictions

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

Credit Hours		Contact
Min	Max	Hrs/Wk 1
1	1	Number of Wks 14

B. REQUESTED LISTING

Home Department	Div #	Course Number

Cross Listed Course Information

Course Title

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	
	Transcript Max = 20 Spaces	

Course Description for Official Publication (Max = 50 words)

PROGRAM OUTCOMES:

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

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

Prerequisites
○ Enforced ○ Advised

Credit Restrictions

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

Credit Hours		Contact
Min	Max	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

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: Maurita Holland **Title** _____

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. Leslie A. Olsen, Technical Communication
Cross-listed Dept(s). _____

SUPPORTING STATEMENT

This class is no longer offered. It has been replaced by other Communication Across the Curriculum courses.

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

1039

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 1/31/2003

Effective Fall 2003

A. CURRENT LISTING

☐

Home Department		Div #	Course Number

☐ Cross Listed Course Information

☐ Course Title

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	
	Transcript Max = 20 Spaces	

☒ **Course Description**
Students will learn both practical skills & theoretical principles necessary to design effective WWW pages & Sites. Practical skills include HTML, tools for creating Web pages, graphics, scripting, animation, & multi-media. Theory includes information design, visual design, & theoretical principles. Students will both design & analyze websites.

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

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

☐ Prerequisites
○ Enforced ○ Advised

☐ Credit Restrictions

☐ **Level of Credit**

		Credit Hours		Contact
☐ Undergrad only	☐ Ugrad or Non-Rckhm Grad	Min	Max	Hrs/Wk ___
☐ Rackham Grad	☐ All Credit types			
☐ Non-Rckhm Grad	☐ Rckhm Grad w/add'l Work			Number
☐ Ugrad or Rckhm Grad		___ ___		of Wks ___

B. REQUESTED LISTING

Home Department		Div #	Course Number
Technical Communication		291	450

Cross Listed Course Information

Course Title
Web Page and Site Design

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	WWW Page Design
	Transcript Max = 20 Spaces	WWW Design

Course Description for Official Publication (Max = 50 words)
Practical skills and theoretical principles necessary to design effective WWW pages and sites, including HTML, tools for creating Web pages, graphics, scripting, animation, and multimedia (practical skills) and information design, visual design, and theoretical principles (theory). Design and analysis of websites.

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

Degree Requirements	○ Degree Requirement	○ Free Elective	● Other Depends on
	○ Core Course	○ Tech Elective	Major of student

Prerequisites Junior or Senior Standing
○ Enforced ○ Advised

Credit Restrictions

Level of Credit

		Credit Hours		Contact
☒ Undergrad only	☐ Ugrad or Non-Rckhm Grad	Min	Max	Hrs/Wk 3
☐ Rackham Grad	☐ All Credit types			
☐ Non-Rckhm Grad	☐ Rckhm Grad w/add'l Work	3	3	Number
☐ Ugrad or Rckhm Grad				of Wks 15

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

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

☐

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

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

Half term ☐ 1st ☐ 2nd

Cognizant Faculty Member: Leslie Olsen / Kara Heinrichs   Title ___

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. Leslie A. Olsen, Technical Communication
Cross-listed Dept(s). ___

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SUPPORTING STATEMENT

Updating of wording to be more in keeping with the adopted style of no subjects or verbs.

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

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 1/31/2003

Effective Fall 2003

A. CURRENT LISTING

Home Department	Div #	Course Number
Technical Communication	291	475

Cross Listed Course Information

Course Title
Directed Study

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	
	Transcript Max = 20 Spaces	

Course Description
Conferences and tutorial sessions for students with special interests
May be taken for 1-4 credit hours as arranged by the instructor.

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

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

Prerequisites Instructor Permission
○ Enforced ○ Advised

Credit
Restrictions

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

Credit Hours		Contact
Min	Max	Hrs/Wk ARR
1	4	Number of Wks 14

B. REQUESTED LISTING

Home Department	Div #	Course Number

Cross Listed Course Information

Course Title

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	
	Transcript Max = 20 Spaces	

Course Description for Official Publication (Max = 50 words)

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

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

Prerequisites Permission of Technical Communication Faculty
○ Enforced ○ Advised

Credit   elective credit only
Restrictions

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

Credit Hours		Contact
Min	Max	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)	Graded Section	Grading	Location
☐ Lec	○ Lec		
☐ Rec	○ Rec		
☐ Sem	○ Sem	☒ A-E	☒ Ann Arbor
☐ Lab	○ Lab	☐ CR/NC	☐ Biological Station
☐ Dis	○ Dis	☐ S/U	☐ Camp Davis
☒ Ind	⊙ Ind	☐ P/F	☐ Extension
☐ Other ____	○ Other	☐ Y	

Printing Information ☒ Print the course in the Bulletin
(Optional) ☒ 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: _____ Title _____
Graduate Faculty Members

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.   Leslie A. Olsen, Technical Communication
Cross-listed Dept(s). _____

56

SUPPORTING STATEMENT

We are deleting TC 475 and resubmitting our directed study course as TC 499 to be more consistent with the College's numbering scheme for courses.

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
1032

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 1/31/2003

Effective Fall 2003

A. CURRENT LISTING

Home Department	Div #	Course Number
Technical Communication	291	486

Cross Listed Course Information

Course Title
Design of Computer Documentation

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	Design Computer Doc
	Transcript Max = 20 Spaces	Computer Doc

Course Description
Application of theories of documentation to actual development and testing of computer documentation. Brief review of documentation theory and current industry guidelines for producing documentation, audience analysis, task analysis, writing, and testing of an actual piece of documentation.

B. REQUESTED LISTING

Home Department	Div #	Course Number

Cross Listed Course Information

Course Title

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	
	Transcript Max = 20 Spaces	

Course Description for Official Publication (Max = 50 words)

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

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

Prerequisites Senior or Graduate Standing
○ Enforced ○ Advised

Credit Restrictions

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

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

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

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

Prerequisites
○ Enforced ○ Advised

Credit Restrictions

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

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

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

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

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

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

Cognizant Faculty Member: Leslie A. Olsen   Title Director, Technical

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. Leslie A. Olsen, Technical Communication
Cross-listed Dept(s). _____

58

SUPPORTING STATEMENT

Deletion of the MS Program and Change to Communication Across Curriculum Program has removed the need for this course. Also this material is now covered in Tech Com 496 for CS+CSE students who were the primary enrollees in TC 486.

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

1033

Print

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 1/31/2003

Effective Fall 2003

A. CURRENT LISTING

Home Department	Div #	Course Number
Technical Communication	291	490

Cross Listed Course Information

Course Title
Technical Information Resources and Research

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	Tech Info Res
	Transcript Max = 20 Spaces	Tec Info Res

Course Description
This course describes and demonstrates all forms of technical information resources now available to engineers. It provides access to a wide variety of resources and systems, with primary emphasis on online networks, and uses conferencing, and database system.

B. REQUESTED LISTING

Home Department	Div #	Course Number

Cross Listed Course Information

Course Title

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	
	Transcript Max = 20 Spaces	

Course Description for Official Publication (Max = 50 words)

PROGRAM OUTCOMES:

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

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

Prerequisites
○ Enforced ○ Advised

Credit Restrictions

Level of Credit		Credit Hours		Contact
☐ Undergrad only	☐ Ugrad or Non-Rckhm Grad	Min	Max	Hrs/Wk __3__
☒ Rackham Grad	☒ All Credit types			
☐ Non-Rckhm Grad	☐ Rckhm Grad w/add'l Work	3	3	Number of Wks __14__
☐ Ugrad or Rckhm Grad				

PROGRAM OUTCOMES:

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

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

Prerequisites
○ Enforced ○ Advised

Credit Restrictions

Level of Credit		Credit Hours		Contact
☐ Undergrad only	☐ Ugrad or Non-Rckhm Grad	Min	Max	Hrs/Wk ___
☐ Rackham Grad	☐ All Credit types			
☐ Non-Rckhm Grad	☐ Rckhm Grad w/add'l Work	___	___	Number of Wks ___
☐ Ugrad or Rckhm Grad				

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

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: Maurita Holland   Title ___

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

Submitted By: ☒ Home Dept. ☐ Cross-listed Dept.
Name, Signature & Department
Home Dept. Leslie A. Olsen, Technical Communication
Cross-listed Dept(s).

Approval

☐ Curriculum Comm. _____

☐ Faculty _____
☐ Rackham _____
☐ Cross listed Unit 1 _____
☐ Cross listed Unit 2 _____

60

SUPPORTING STATEMENT

This class is no longer needed. Deletion of MS Program and change to Courses Across the Curriculum Program has removed the
need for this course.

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

Detail the Special requirements

Form Number

1030

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 1/31/2003

Effective Fall 2003

A. CURRENT LISTING

Home Department	Div #	Course Number
Technical Communication	291	497

Cross Listed Course Information

Course Title
Argument and Persuasion

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	Argument An Pers.
	Transcript Max = 20 Spaces	Argumnt & Prs.

Course Description
A course in logical argument and its role in persuasive discourse, especially writing. The course focuses on the nature of a reasoned argument, the formulation and analysis of problems, and methods of selecting, arranging, writing, and editing information on the basis of the intended effect on a particular audience.

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

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

Prerequisites   Senior Standing
○ Enforced ○ Advised

Credit Restrictions

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

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

B. REQUESTED LISTING

Home Department	Div #	Course Number

Cross Listed Course Information

Course Title

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	
	Transcript Max = 20 Spaces	

Course Description for Official Publication (Max = 50 words)

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

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

Prerequisites
○ Enforced ○ Advised

Credit Restrictions

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

Credit Hours			Contact
Min	Max		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)		Graded Section	Grading	Location
☐ Lec		○ Lec		
☐ Rec		○ Rec	☒ A-E	☒ Ann Arbor
☒ Sem		○ Sem	☐ CR/NC	☐ Biological Station
☐ Lab		○ Lab	☐ S/U	☐ Camp Davis
☐ Dis		○ Dis	☐ P/F	☐ Extension
☐ Ind		○ Ind	☐ Y	
☐ Other ____		○ Other		

Printing Information   ☐ Print the course in the Bulletin
(Optional)   ☐ 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: Leslie A. Olsen / Peter Klaver   Title Director, Technical

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

Submitted By: ☒ Home Dept. ☐ Cross-listed Dept.
Name, Signature & Department
Home Dept.   Leslie A. Olsen, Technical Communication
Cross-listed Dept(s). _____

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

SUPPORTING STATEMENT

TC 498, 492, 497, and 450 used to satisfy the senior rhetoric requirement in the college, with the implementation of the Communication-Across-the-Curriculum Program (CAC) and Curriculum 2000, the old 1-course, senior rhetoric requirement has been replaced by the CAC requirement in each department. TC 497 has not been offfered for many years. Elements of this course now appear in all communication across the curriculum courses.

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

Detail the Special requirements

Form Number

1035

Print

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 1/31/2003

Effective Fall 2003

A. CURRENT LISTING

Home Department	Div #	Course Number

Cross Listed Course Information

Course Title

TITLE ABBRE-VIATION	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 ○ Free Elective ○ Other
○ Core Course ○ Tech Elective

Prerequisites
⦿ Enforced ○ Advised

Credit
Restrictions

Level of Credit		Credit Hours		Contact
☐ Undergrad only ☐ Ugrad or Non-Rckhm Grad		Min	Max	Hrs/Wk ___
☐ Rackham Grad ☐ All Credit types				
☐ Non-Rckhm Grad ☐ Rckhm Grad w/add'l Work				Number
☐ Ugrad or Rckhm Grad		___	___	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   *Depends on student advisor*

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

Approval

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

B. REQUESTED LISTING

Home Department	Div #	Course Number
Technical Communication	291	499

Cross Listed Course Information

Course Title
Scientific and Technical Communication

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	Sctfc & Tech Comm
	Transcript Max = 20 Spaces	Sci/Tech Comm

Course Description for Official Publication (Max = 50 words)
Conferences and tutorial sessions for students with special interests. May be taken for 1-4 credit hours as arranged by the instructor. Not intended as substitutes for regularly scheduled classes.

PROGRAM OUTCOMES:

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

Degree Requirements ○ Degree Requirement ○ Free Elective ⦿ Other *Depends on student advisor & Home Department*
○ Core Course ○ Tech Elective

Prerequisites Permission of Technical Communication Faculty
⦿ Enforced ○ Advised

Credit   Elective Credit Only
Restrictions

Level of Credit		Credit Hours		Contact
☒ Undergrad only ☐ Ugrad or Non-Rckhm Grad		Min	Max	Hrs/Wk ARR
☐ Rackham Grad ☐ All Credit types				
☐ Non-Rckhm Grad ☐ Rckhm Grad w/add'l Work		1	4	Number
☐ Ugrad or Rckhm Grad				of Wks 14

Printing Information ☒ Print the course in the Bulletin
(Optional) ☒ 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: _____ Title _____

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

Submitted By: ☐ Home Dept. ☐ Cross-listed Dept.
Name, Signature & Department

Home Dept. Leslie A. Olsen, Technical Communicaton
Cross-listed Dept(s). _____

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SUPPORTING STATEMENT

We are deleting TC 475 and adding TC 499 as our directed studies course to better match the College's scheme for numbering courses.

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

Detail the Special requirements