The University of Michigan
College of Engineering
Curriculum Committee

Agenda
April 18, 2006
1:30-3:30 p.m.
GM Room
Fourth Floor Lurie Engineering Center

1. Approval of Minutes from April 04, 2006 Meeting

2. Program Changes AO&SS

3. Course Approvals

4. Vote for New CoE CC Chairperson

University of Michigan
College of Engineering
Curriculum Committee Meeting
Tuesday April 4, 2006
1:30-3:30 p.m.
Lurie Engineering Center GM Room
Minutes

Jeff Fessler called the meeting to order at 1:40 p.m.

Members Present: J.Fessler, J.Barker, L.Bernal, S.Holleran, D.Karr, M.Keyserling, C.Lastoskie, W.McGruder, J Patel, H.Peng, R.Robertson, M.Solomon, S.Takayama, T.Teorey

Members Absent: G.Herrin, Z.He (NERS),) G.Hulbert, (ME) S.Pang, R.Sulewski (TECH COMM)

Guests: Henia Kamil, Yogesh Gianchandani, Jianjun Shi

Motion to approve the minutes of the last meeting

The minutes of the last meeting were approved

Proposed Certificate Program for Graduate Studies

Information regarding this Program was included in the meeting packet. Huei Peng brought a revised proposal that was changed from the proposal presented at the last CC meeting. At the last meeting there were two certificate proposals and now there is only one proposal. He stated that now they are proposing a template for this program.

The goal of this proposal is to establish a graduate certificate program that is more flexible for professional students. 12 to 15 hours of graduate course work will be required to complete the certificate. The proposed certificate program will require the same level of rigorousness compared with traditional M.S. and M. Eng. degree programs currently offered in the College. The credit hour requirement is determined by examining the requirements of similar graduate certificate programs, both at the University of Michigan, and at peer institutions (e.g., Penn State World Campus, UW-Madison, UC Berkeley, UIUC, and Purdue Materials Engineering,
This certificate will be administered by Inter-Pro.
Discussion.
There was concern about double counting—it was agreed that this will be removed. It was also agreed to have the credit hours be 15 instead of 12 to 15.
Jeff Fessler asked for a motion to approve the template proposing the title to be **Certificate of Advanced Studies in Engineering (CASE)**; **15 credit hours, no double counting, deleting the transfer of credits between the Certificates and the transfer of credits to the M Eng degree.**
This was moved and seconded.
Further discussion. It was decided that each proposed Certificate will need to receive approval from the College of Engineering.

It was decided to have two separate votes. The first vote was to accept the template (the first four pages of the document). The template was approved unanimously.
Jeff asked for a motion to approve any of the proposed Certificates that meet the template that was just approved. This was moved and seconded. There was discussion regarding this. Certificates **#3** (**Graduate Certificate in Integrated Microsystems** and **#4 (Certificate in Pharmaceutical Engineering**. Both these certificates were approved unanimously.

Discussion of "Content Transcript

Jeff Fessler stated that in the last joint ENGR/LS&A Curriculum committee meeting he asked about the status of the median grade reporting and was told that the Provost will be deciding this, so he e-mailed the Provost to find out the status of this. He did receive a response and the Committee had a brief discussion regarding this. A copy of that e-mail was included in the meeting packet.

Declaration Requirements

There was information regarding this handed out at the meeting.
Toby Teorey stated that at the last Undergrad Advisors meeting it came to light that the wording in the College of Engineering Bulletin (pg 50, first paragraph): **Declaring a Degree Program** needs to be replaced.
This is for information only.

Course Approval Forms

THESE COURSES WERE APPROVED

AOSS 463 Modification – Added prerequisites: Math 215; added outcomes
CHE 558(X-Listed with MSE 558) New Course
EECS 509 New Course
EECS 524 Deletion
EECS 534 Deletion
EECS 559 Modification – Changed Term taught from: Winter ***to: Fall***
EECS 588 Modification – Changed credit hours from: 3 ***to: 4***
EECS 659 Modification – Changed Terms of offering from: Alternate Years ***to: odd years***
IOE 434 New Course
IOE 463(X-Listed with MFG 463 Modification – Changed Title from: Work Measure & Prediction ***to: Measurement and Design at Work***; Changed Description; Changed prerequisites from: IOE 333 and 334 and 366 C- or better or graduate standing (enforced) ***to: IOE 333 or ME 395 or BME 231 and IOE 265 or Stats 412 (advised);*** Changed credit hours from 2 ***to:3***; Changed contact hours from 4 ***to: 3***
MSE 220 Modification – Changed terms taught from: Fall, Winter ***to: Fall, Winter, Spring***
MSE 250 Modification – Changed terms taught from: Fall, Winter, Spring, summer ***to: Fall, Winter***
MSE 350 Modification – Changed Description

THESE COURSES WERE TABLED

AOSS 711 New Course
ME 487(X-Listed with MFG 488) Modification – Changing prerequisite from ME 481 ***to: ME 382***
NAME 387 New Course Corrected prerequisite **to: Math 116**;

Jeff Fessler called for a motion to approve the following courses. This was moved and seconded.

Adjournment: Motion to adjourn was made and seconded
Motion carried (approved)
Next Meeting Tuesday, April 18, 2006
GM Room – Fourth Floor LEC

MEMORANDUM

TO: **COE CURRICULUM COMMITTEE**

FROM: **Department of Atmospheric, Oceanic, & Space Sciences**

SUBJECT: **Undergraduate Program Changes**

DATE: **April 11, 2006**

AOSS has been reviewing its program in Earth System Science and Engineering. As a result, we have decided to makes several changes. The changes fall into two categories: trivial changes due to typos and trivial errors in course numbers, etc., and more substantive changes. The substantive changes amount to changing some of the technical courses required in one concentration and adding a course to another concentration. The technical and unrestricted electives have been reduced in order to keep the total credit hour requirements the same as before. The core courses have not been changed.

Specific Changes

Meteorology Concentration

1. AOSS 451 (Atmospheric Dynamics I) is now required for this concentration. Graduate schools and employers expect the students to have mastered this material. Previously, it was recommended as a technical elective; now it is required.
2. The required concentration course credit hours have been increased from 11 to 15.
3. The technical elective credit hours have been reduced from 16 to 12.
4. Unrestricted electives have not been changed.

Climate Physics Concentration

This concentration was changed considerably. We have endeavored to maintain great flexibility, which is needed for this concentration because the climate system is so complex. We have also tried to make the requirements clearer to potential students in this area.

1. An error in a concentration course was corrected: the correct AOSS 470 (Solar Terrestrial Interactions) replaced AOSS 464 (Introduction to the Space Environment) in some of the materials related to this course.
2. Because we decided that AOSS 450 (Geophysical Electromagnetics) is not appropriate for all students in this concentration, it is no longer required. It can still be selected as a technical elective.
3. AOSS 411 (Cloud and Precipitation Processes) is now required as a concentration course because water and precipitation are central to the entire earth system, touching on most aspects of climate, earth system energy, transport, etc. We feel that all students in this concentration should master this material.
4. AOSS 467 (Biogeochemical Cycles) is now required as a concentration course. This course provides an important overview of chemical transformations and exchange within the earth system.

5. The required concentration course credit hours have increased from 8 to 10.
6. Technical elective credit hours have decreased from 20 to 15.
7. Unrestricted course credit hours have increased from 9 to 12.

Space Weather Concentration

Since ENG 450 (Multidisciplinary Design) is a 3 credit hour course, the listing in the bulletin was changed, with adjustments to the elective courses.

1. ENG 450 (Multidisciplinary Design) is listed as 3 credit hours.
2. The required concentration course credit hours have been reduced from 16 to 15.
3. The technical elective credit hours have been increased from 12 to 13.
4. Unrestricted electives have not been changed.

REVISED SECTIONS FOR BULLETIN

Undergraduate Education

Degree Program

Earth System Science Engineering (ESSE) is a joint program between AOSS and the LSA Department of Geological Sciences. ESSE students begin to understand the interactions among all of the Earth system components while gaining in-depth knowledge in one of three concentrations: Meteorology, Climate Physics or Space Weather.

The B.S.E. degree in AOSS prepares graduates for employment in NOAA and other government agencies, private weather forecasting companies, air- and water-quality management firms. ESSE students who complete Space Weather, Meteorology or Climate Physics concentrations will be exceptionally well prepared for graduate studies in atmospheric science, space science or space engineering.

In addition to the College of Engineering core courses, all AOSS undergraduate students take four ESSE core courses (17 credit hours) plus five AOSS/ESSE core courses (20 credit hours) that introduce the various aspects of atmospheric, oceanic and space sciences, emphasizing the common elements of, and the interactions between, the various disciplines and the scientific basis of the phenomena that are observed. An additional three or four courses (10 to 15 credit hours) are specific to the concentration area and the remaining credit hours are split between technical and unrestricted electives. The electives must be at the 300-level or above and approved by the undergraduate advisor. Completion of a concentration will be noted on the student's transcript.

Concentrations

Meteorology
Graduates with a concentration in Meteorology will be prepared for careers in weather forecasting, industries that are increasingly the source of weather analyses and predictions modeling, and for graduate studies in meteorology and the technologies that enable weather and climate prediction. The concentration meets the requirements of the American Meteorological Society and the National Weather Service.

Required (15 credit hours):
Weather Systems (3)
Meteorological Instrumentation (4)
Meteorological Analysis Laboratory (4)
Atmospheric Dynamics I (4)
Students electing this concentration are encouraged to complete an internship in a weather forecasting office.

Climate Physics

Graduates with a Climate Physics concentration will be prepared for careers in engineering that increasingly provide the water resource, agricultural, seasonal recreation and transportation industries with near-term climate analyses and predictions, and for graduate studies involving the technologies that enable weather and climate prediction.

Required (10 credit hours):
Biogeochemical Cycles (3)
Cloud and Precipitation Processes (3)
Solar-Terrestrial Interaction (4)

Space Weather
Graduates with a Space Weather concentration will be prepared to join the space industry, which faces severe workforce shortage in the near term. They can also join government agencies and federal laboratories that deal with space related disciplines.

Required (15 credit hours):
EM Waves and Radiation (4)
Solar-Terrestrial Interaction (4)
Space and Spacecraft Environment (4)
Multidisciplinary Design (3)

Sample Schedule
B.S.E. (Earth System Science and Engineering)

	Credit Hours	Terms 1	2	3	4	5	6	7	8
Subjects required by all programs (55 hrs.)									
Mathematics 115, 116, 215, and 216	**16**	4	4	4	4	–	–	–	–
ENG 100, Intro to Engr	**4**	4	–	–	–	–	–	–	–
ENG 101, Intro to Computers	**4**	–	4	–	–	–	–	–	–
Chemistry 125/126 and 130 or Chemistry 210/211	**5**	5	–	–	–	–	–	–	–
Physics 140/141; 240/241	**10**	–	5	5	–	–	–	–	–
Humanities and Social Sciences	**16**	3	3	3	4	3	–	–	–
Required Subjects (36 hrs.)									
AOSS 320, Earth System Evolution	**4**	–	–	4	–	–	–	–	–
AOSS 321, Earth System Dynamics	**4**	–	–	–	4	–	–	–	–
EECS 206, Signals and Sys. I & AOSS 323 Analysis	**4**	–	–	–	4	–	–	–	–
AOSS 350, Atmospheric Physics I	**4**	–	–	–	–	4	–	–	–
AOSS 401, Geophysical Fluid Dynamics	**4**	–	–	–	–	4	–	–	–
AOSS 380, Atmospheric Physics II	**4**	–	–	–	–	–	4	–	–
AOSS 410, Earth System Modeling	**4**	–	–	–	–	–	–	4	–
AOSS 475, Earth-Ocean-Atmosphere Interactions	**4**	–	–	–	–	–	–	–	4
Meteorology and Climate Physics Concentrations:									
[1]Stats	**4**	–	–	–	–	–	4	–	–
Space Weather Concentration:									
Math 450, Advanced Mathematics for Engineers I	**4**	–	–	–	–	–	4	–	–
Concentrations: (select one)									
Climate Physics: (37 hrs.)									
AOSS 411, Cloud and Precipitation Processes	**3**	–	–	–	–	–	–	–	3
AOSS 467, Biogeochemical Cycles	**3**	–	–	–	–	–	–	–	3
AOSS 470, Solar Terrestrial Interactions	**4**	–	–	–	–	–	4	–	–
Technical Electives	**15**	–	–	–	–	5	4	6	–
Unrestricted Electives	**12**	–	–	–	–	–	–	6	6
Meteorology: (37 hrs.)									
AOSS 414, Weather Systems	**3**	–	–	–	–	3	–	–	–
AOSS 462, Instrumentation for Atmos & Space Sciences	**4**	–	–	–	–	–	–	–	4
AOSS 451, Atmospheric Dynamics I	**4**	–	–	–	–	–	–	–	4
AOSS 440, Meteorological Analysis Laboratory	**4**	–	–	–	–	–	–	4	–
Technical Electives	**12**	–	–	–	–	4	–	4	4
Unrestricted Elective	**10**	–	–	–	–	–	5	5	–
Space Weather: (37 hrs.)									
AOSS 450, Geophysical ElectroMagnetics	**4**	–	–	–	–	–	–	4	–
AOSS 470, Solar Terrestrial Interactions	**4**	–	–	–	–	–	–	–	4
AOSS 464, Space and Spacecraft Environment	**4**	–	–	–	–	–	–	4	–
ENG 450, Multidisciplinary Design	**3**	–	–	–	–	–	–	–	3
Technical Electives	**13**	–	–	–	–	4	5	4	–

Unrestricted Electives	**9**	–	–	–	–	–	4	–	5

Candidates for the Bachelor of Science degree in Engineering (Earth System Science and Engineering) — B.S.E (E.S.S.E.) — must complete the program listed above. This sample schedule is an example of one leading to graduation in eight terms.

Notes:
[1]Stats 412, Introduction to Probability and Statistics (3 credits) or IOE 265, Probability and Statistics for Engineers (4 credits).

AOSS Curricula - Beginning Fall, 2006

AOSS Undergraduate Curriculum - Meteorology Concentration

Semester	1		2		3		4		5		6		7		8		
Course 1	Math 115	4	Math 116	4	Math 215	4	Math 216	4	AOSS 350: Atmos Physics I	4	AOSS 380: Atmos Physics II	4	AOSS 410: Earth Sys Models	4	AOSS 475: Earth-Ocean-	4	
Course 2	Chem 125/130	5	Phys 140/141	5	Phys 240/241	5	EECS 206 & AOSS 323	4	AOSS 401: Geophys Fluid Dyn	4	Stats*	4	AOSS 440: Met Analysis	4	AOSS 462: Meteor Instru	4	
Course 3	Engin 100	4	Engin 101	4	AOSS 320: Earth Sys Evolution	4	AOSS 321: Earth Sys Dynamics	4	Tech Elective	4	AOSS 414: Weather Systems	3	Tech Elective	4	AOSS 451: Atmospheric Dynamics	4	
Course 4	Hu/SS	3	Hu/SS	3	Hu/SS	3	Hu/SS	4	Hu/SS	3	Free Elective	5	Free Elective	5	Tech Elective	4	
College		13		13		9		4									39
Hum/SS		3		3		3		4		3							16
Core						4		8		8		8		4		4	36
Conc												3		4		8	15
Tech										4				4		4	12
Free												5		5			10
		16		16		16		16		15		16		17		16	128

Stats*: Either Stats 412 (3) or IOE 265 (4)

AOSS Undergraduate Curriculum - Climate Physics Concentration

Semester	1		2		3		4		5		6		7		8		
Course 1	Math 115	4	Math 116	4	Math 215	4	Math 216	4	AOSS 350: Atmos Physics I	4	AOSS 380: Atmos Physics II	4	AOSS 410: Earth Sys Models	4	AOSS 475: Earth-Ocean-	4	
Course 2	Chem 125/130	5	Phys 140/141	5	Phys 240/241	5	EECS 206 & AOSS 323	4	AOSS 401: Geophys Fluid Dyn	4	Stats*	4	Tech Elective	3	AOSS 411: Cloud & Precip	3	
Course 3	Engin 100	4	Engin 101	4	AOSS 320: Earth Sys Evolution	4	AOSS 321: Earth Sys Dynamics	4	Tech Elective	5	AOSS 470: Solar Terr Inter	4	Tech Elective	3	AOSS 467: Biogeochem Cycles	3	
Course 4	Hu/SS	3	Hu/SS	3	Hu/SS	3	Hu/SS	4	Hu/SS	3	Tech Elective	4	Free Electives	6	Free Elective	6	
College		13		13		9		4									39
Hum/SS		3		3		3		4		3							16
Core						4		8		8		8		4		4	36
Conc												4				6	10
Tech										5		4		6			15
Free														6		6	12
		16		16		16		16		16		16		16		16	128

AOSS Undergraduate Curriculum - Space Weather Concentration

Semester	1		2		3		4		5		6		7		8		
Course 1	Math 115	4	Math 116	4	Math 215	4	Math 216	4	AOSS 350: Atmos Physics I	4	AOSS 380: Atmos Physics II	4	AOSS 410: Earth Sys Models	4	AOSS 475: Earth-Ocean-	4	
Course 2	Chem 125/130	5	Phys 140/141	5	Phys 240/241	5	EECS 206 & AOSS 323	4	AOSS 401: Geophys Fluid Dyn	4	Math 450	4	AOSS 450: Geophysical EM	4	AOSS 470: Solar Terr Inter	4	
Course 3	Engin 100	4	Engin 101	4	AOSS 320: Earth Sys Evolution	4	AOSS 321: Earth Sys Dynamics	4	Tech Elective	4	Tech Elective	5	AOSS 464: Intro Space	4	ENG 450: Multidisc. Design	3	
Course 4	Hu/SS	3	Hu/SS	3	Hu/SS	3	Hu/SS	4	Hu/SS	3	Free Elective	4	Tech Elective	4	Free Elective	5	
College		13		13		9		4									39
Hum/SS		3		3		3		4		3							16
Core						4		8		8		8		4		4	36
Conc														8		7	15
Tech										4		5		4			13
Free												4				5	9
		16		16		16		16		15		17		16		16	128

LEGEND

College requirements
AOSS Core - Common to all Concentrations
Concentration classes
Tech and Free Electives

COURSE APPROVAL FORMS

For April 18, 2006 CoE CC Meeting

AOSS 411 Modification – Changing Prerequisites from: AOSS 430 ***to: AOSS 350, MATH 216***

AOSS 451 (X-Listed with ENS 451) *Revision of formerly tabled course*Modification – Changing Prerequisites from: AOSS 401 or equivalent or permission of instructor ***to: AOSS 401 or MATH 450***

NAME 387 New Course

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

Print

Form Number **1683**

[Tabled] re-submitting 4-18-06

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 2/16/2006
Effective Fall 2006

A. CURRENT LISTING

Home Department | Div # | Course Number

Cross Listed Course Information

Course Title

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

Course Description

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

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

☒ Prerequisites AOSS 430
○ 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

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

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

Grading ☒ A-E ☐ CR/NC ☐ S/U ☐ P/F ☐ Y

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

B. REQUESTED LISTING

Home Department: Atmospheric, Oceanic, & Space Sciences | Div #: AOSS | Course Number: 411

Cross Listed Course Information

Course Title: Cloud and Precipitation Processes

TITLE ABBREVIATION		
	Time Sched Max = 19 Spaces	Cloud & Precip Proces
	Transcript Max = 20 Spaces	Cl & Pre Pro

Course Description for Official Publication (Max = 50 words)
The special nature of water substance; nucleation of phase changes in the free atmosphere; the structure and content of clouds; the development of physical characteristics of precipitation; and the dynamics of rain systems.

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

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

Prerequisites AOSS 350, 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 Min 3 Max 3
Contact Hrs/Wk 3
Number of Wks Term

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: Joyce Penner **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. AOSS-John Barker
Cross-listed Dept(s).

Form Number

1683

SUPPORTING STATEMENT

After the extensive revision of the AOSS undergraduate program last year, we have identified several minor adjustments to prerequisites that are needed. The minor change to prerequisites requested for this course will better reflect the actual course content.

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

Detail the Special requirements

Supporting Information for AOSS-411

Course Overview

This course has been taught in AOSS for many years. It is concerned with water substance in the atmosphere. Since clouds and precipitation affect many aspects of earth's climate system, this specialized knowledge is needed in multidisciplinary efforts involving climate radiative forcing, atmospheric chemical composition, hydrology, terrestrial soil moisture, etc.

Because of extensive hydrogen bonding, condensed water has special properties (density, heat capacity, solvation, vapor pressure, latent heat). Considerable class time is spent on the thermodynamics of phase changes involving water and using mathematical approaches to describe the association of water with aerosol substances. Class time is also used to describe the microscopic processes connected with water condensation on cloud condensation nuclei and subsequent evolution of cloud droplets. Cloud droplet growth results in precipitation, latent heat release, and subsequent feedback in cloud dynamics. Clouds also affect local radiative transfer, which also feeds back into the dynamics of clouds and precipitation. The qualitative understanding of cloud and precipitation processes is needed both by forecast meteorologists and by climate scientists. Quantitative understanding is needed in order to implement numerical models that are used to design experiments and interpret observations. As part of a group project, students carry out this type of analysis and work to design experiments. The project results are presented in oral and written reports.

Program Outcomes

ABET Engineering Criteria 2000

a) ability to apply knowledge of mathematics, science, and engineering.

b) ability to design and conduct experiments, as well as to analyze and interpret data.

d) ability to function on multidisciplinary teams.

e) ability to identify , formulate, and solve engineering problems.

g) ability to communicate effectively.

i) recognition of the need for and an ability to engage in life-long learning.

j) knowledge of contemporary issues

k) ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

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

Print

Form Number **1685**

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

Tabled re-submitting 4-18-06

Date 2/20/2006
Effective Fall 2006

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 ☐ l

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

☒ Prerequisites AOSS 401 or equivalent or permission of instructor
○ Enforced ⊙ Advised

Credit Restrictions

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

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

B. REQUESTED LISTING

Home Department: Atmospheric, Oceanic, & Space Sciences | Div #: AOSS | Course Number: 451

Cross Listed Course Information: ENSCEN | ENS | 451

Course Title: Atmospheric Dynamics I

TITLE ABBRE-VIATION	Time Sched Max = 19 Spaces	Atmos Dynamics I
	Transcript Max = 20 Spaces	Atmos Dyn I

Course Description for Official Publication (Max = 50 words)
Quasi-geostrophic energetics; fronts; the mean circulation; planetary and equatorial waves; overview of the dynamics of the middle atmosphere; wave-mean flow interaction; spectral methods; and tropical meteorology.

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 AOSS 401 or Math 450
○ Enforced ⊙ Advised

Credit Restrictions

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

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

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) ☒ 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

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

Cognizant Faculty Member: John P. Boyd **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. AOSS - John Barker
Cross-listed Dept(s). ENSCEN -

Form Number

1685

SUPPORTING STATEMENT

After the extensive revision of the AOSS undergraduate program last year, we have identified several minor adjustments to prerequisites that are needed. The minor change to prerequisites requested for this course will better reflect the actual course content.

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 1665

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 1/19/2006
Effective Winter 2007

A. CURRENT LISTING

Home Department | Div # | Course Number

Cross Listed Course Information

Course Title

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

Course Description

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

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 Min ___ Max ___ | Contact Hrs/Wk ___ | Number of Wks ___

B. REQUESTED LISTING

Home Department: NAVARCH | Div #: 284 | Course Number: 387

Cross Listed Course Information

Course Title: Introduction to Probability and Statistics for Marine Engineers

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

Course Description for Official Publication (Max = 50 words)
Fundamentals of probability theory, with marine engineering applications. An introduction to statistics, estimation, goodness of fit, regression, correlation, engineering 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 MTH 116 (C-) ⊙ 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 3 Max 3 | Contact Hrs/Wk 3 | Number of Wks 14

C.

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

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

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

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

Half term ☐ 1st ☐ 2nd

Cognizant Faculty Member: A.N. Perakis 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. Marc Perlin NA&ME
Cross-listed Dept(s). ___

Form Number

1665

SUPPORTING STATEMENT

The aim of the course is to educate students in probability and statistics. In addition to NAME students, students in CEE and other COE departments may be interested. The course is timed so that the probability is completed when needed for NA 340 (a co-requisite). NOTE: both classes are given in winter semester. In addition, NA 387 has more of the relevant statistics and applications for NAME.

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

Detail the Special requirements

Course Title:	Introduction to Probability and Statistics for Marine Engineers
Course Function:	Required course; third year
Cognizant Faculty:	A.N. Perakis
Credit Hours:	3
Schedule:	Winter Term
Prerequisites:	Prerequisite: Math 116
Short Description:	Introduction to the fundamentals of probability theory, with engineering applications. Engineering Statistics, estimation, goodness of fit, regression, correlation.
Text:	Textbook, Devore, Probability And Statistics for Engineering and the Sciences, sixth edition, Thomson, publisher, 2004, required. Student Solutions Manual for Probability and Statistics, sixth edition, Thompson, 2004), recommended.

Outline and Time Allocation		hours
I.	Intro. to Probability Random processes and Statistics, Mechanics of NA387	2
II.	Introduction to Probability Theory	20
	Introduction - definitions	2
	Conditional prob., independence, Bayes theorem	4
	Random variables, discrete and continuous; PMF's and PDF's	4
	Mean, variance, moments and central moments of Random Variables.	2
	Examples-uniform, exponential Gaussian; the Central Limit theorem.	3
	Functions of several random variables; joint PDF-PMF's	3
	Linear and statistical independence of RV's; correlation	2
III.	Introduction to Statistics	12
	Introduction to statistics-sampling	2
	Estimation, Point and Interval	4
	Hypothesis tests	2
	Curve fitting, regression, correlation	2
	Goodness of fit tests, Chi2, K-S	2
IV.	Marine Applications of Probability and Statistics	5
	Two Midterms and one Final Examinations	5
	Total	44

ABET Categories:	Engineering Science (1.0), Mathematics (2.0)
Threads Served:	Dealing with Uncertainty, Computing
Computing:	Use of educational probability and statistics software available on CAEN computers; use of spreadsheets throughout the course.

COURSE PROFILE

Degree Program: Naval Architecture and Marine Engineering **Date: April 10, 2006**

Prepared by: A.N. Perakis

COURSE #: NA 387	COURSE TITLE: PROBABILITY AND STATISTICS FOR MARINE ENGINEERS
TERMS OFFERED: Winter	For each prerequisite below, "E" denotes Enforced and "A" denotes Advised.
TEXTBOOKS/REQUIRED MATERIAL: Devore, Probability And Statistics for Engineering and the Sciences, sixth edition, 2004	**PREREQUISITES: Math 116 E**
INSTRUCTOR(S): Anastassios N. Perakis	**COGNIZANT FACULTY:** Anastassios N. Perakis
CoE BULLETIN DESCRIPTION: Fundamentals of probability theory, with engineering applications. Engineering Statistics, estimation, goodness of fit, regression, correlation. Assorted Marine Applications.	**COURSE TOPICS:** 1. Introduction to Probability Theory. 2. Introduction to Statistics.
COURSE STRUCTURE/SCHEDULE: Lecture: 2per week @ 1.5 hour	

COURSE OBJECTIVES	1. To explain the concepts of basic probability at a level the students will need for several 300 and 400 level required courses, and also after graduation. 2. To give students the basic methods of statistics and data analysis techniques. 3. To illustrate the above with several simple and complex marine applications.

COURSE OUTCOMES For each course outcome, the following links are identified: •links to **course objectives** in square brackets [ ]; •links to **program educational outcomes** in parentheses ( ); •links to **ABET criteria** (a-k) in curly brackets {}.	1. Develop a thorough understanding of the basic principles of Probability Theory.[1]; (I, II, VI, XII); {a, k} 2. Ability to use the basic methods of Statistics and Data analysis techniques for marine applications and in general.[2]; (I, II, VI, XII); {a, b, k} 3. Become exposed to more complex application of probability and statistics in the marine field (examples from systems and structural reliability and safety, seakeeping events modeling, etc.).[3]; (I, II, VI, XII); {a, b, e, h, j, k}
ASSESSMENT TOOLS For <u>each</u> assessment tool, links to the **course outcomes** are identified.	1. A brief first midterm exam (closed book, formula sheet) to check class knowledge of basics. (10% of course grade) (1) 2. A second midterm exam (closed book formula sheet), measuring outcomes 1 and 3 for individual students under time constraint.(30% of grade) (1,3) 3. One final exam (closed book, 2 formula sheets allowed), measuring all outcomes above, for individual students under time constraint. (40% of course grade) (1,2,3,) 4. Weekly homework assignment sets measuring outcomes 1 to 3 with less severe time constraint (1,2,3) and under conditions in which a small level of discussion is permitted before each student solves the problems individually. (20% of grade) 5. Course evaluation by each student at the end of the course, used for assessing all outcomes of the course. (1,2,3) 6. Re-evaluation by students at the end of courses NA470 and NA475, used to evaluate all 3 above outcomes. (1,2,3)