The University of Michigan
College of Engineering
Curriculum Committee

Agenda
December 16, 2003
1:30-3:00 p.m.
GM Room
Fourth Floor Lurie Engineering Center

1. Approval of Minutes from December 2, 2003 Meeting
2. International Programs – Melissa Eljamal
3. Course Approval Forms
4. Program Change for AOSS
5. SGUS AOSS/Space Engineering
6. Revisit C- College Rule for Common Core Courses

University of Michigan
College of Engineering
Curriculum Committee Meeting
Tuesday December 2, 2003
1:30-3:00 p.m.
Lurie Engineering Center GM Room
Minutes

Greg Hulbert called the meeting to order at 1:45 p.m.

Members Present: G.Hulbert, C. Cesnik E. Chan, J.Fessler W. Hansen, S, Montgomery, M. Parsons, J. Patel, H. Peng, R. Robertson P. Samson, S. Takayama, L. Thompson

Members Absent: J. Holloway (NERS), J. Horton, Y.Liu(IOE), S. Pang, J. Williams

Motion to approve the minutes of the last meeting

Discussion of minutes

The minutes of the last meeting were approved

MDDP Agreement with Bus Admin and Engineering

A letter from Renee Peterson (Business School) and the proposed MDDP (Multiple Dependent Degree Program) Agreement between the College of Engineering and School of Business Administration with some changes made by the Business School.. were included in the meeting packet.
Mike Parsons questioned the requirement that the Business School be the home department since they are a Junior-Senior program.
Susan Montgomery said it should be up to the student. She noted that the two schools have different drop deadlines.
Greg Hulbert said that he will get answers to these questions and table this for now and come back to this discussion.

Discussion of the ABET Coordinators Committee – Jeanne Murabito

Greg Hulbert stated that he had asked Jeanne Murabito to work towards a connection between what is going on with this Committee and the upcoming 2005 ABET visit. Jeanne passed out some material. (Program Evaluator Worksheet).
Jeanne gave a presentation that she had given to the Department Chairs the week before.
Some of the topics covered were:
What will the ABET Evaluators be looking for?
Why are we seeking ABET accreditation?
Where are we now?
Who is leading the effort to reaccredit our undergraduate programs?
What needs to be accomplished by Fall 2005?

DETAILED TIMELINE FOR COE PROGRAMS

Fall 2003 – Select an ABET Coordinator and orient him/her to the tasks
Winter 2004 – Tune up and document the program's Program Review Process
Implement the program review process
Fall 2004 – Engage in the self-study and draft the report
Implement the program review process
Winter 2005 – Revise and edit the self-study report
Implement the program review process
June 2005 – Submit Self-Study document to ABET
Fall 2005 – Coordinate and co-host the ABET Evaluator Visit
Implement the program review process
The ABET Committee will be meeting monthly.

IOE Undergrad Program Requirement Change

A letter and sample schedule was included in the meeting packet. In the proposed program change, IOE is changing IOE 474 (4 cr. hrs.) from a technical elective to a required course. This will reduce the IOE technical elective credit hour requirement from 16 credit hours to 12.
Greg Hulbert asked for a motion to approve the IOE Program Change as stated in the memo. Moved and seconded.
Discussion. Mike Parsons noted that the total under Required Program Subjects shows 28 and should be 32. The 4 was missing for IOE 474. IOE will be asked to correct this.
Technical Communications 380 also needs approval since it doesn't appear in the current College bulletin.
One Abstention Motion **Carried (approved)**

CEE Sample Schedule – Will Hansen

A letter and sample schedule was included the meeting packet. In the requested program change CEE is requesting approval of a program change to reflect the introduction of a new course on thermodynamics in the CEE curriculum (CEE 230).
Greg Hulbert asked for a motion to change the program to incorporate CEE 230. Moved and seconded. Discussion.
Motion carried (approved)

Course Approvals

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

EECS 230 Modification – Changed Prerequisites from: MATH 215, PHYS 240 (or 260) and EECS 215 ***to: MATH 215, PHYS 240 (or 260) preceded or accompanied by EECS 215.***

EECS 511 New Course (changed pre-req from enforced **to: advised.**)
MFG 503 (X-Listed with OMS 703) Modification – Changed Level of Credit from: Non-Rackham Grad ***to: Rackham Grad and Non-Rackham Grad***, Changed Grading from: S/U ***to: A-E.***
IOE 516 (tabled from Nov. 4 Meeting) Corrections made to supporting statement.

AOSS Overview of Upcoming Changes – Perry Samson

Perry Samson handed out 3 pages The AOSS Department has gone through a review of itself at the request of the Dean. The outcome included a new chairman and re-organization in the building.
Included in this is the deletion of quite a few courses, which will be presented at the next meeting.

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

Next Meeting
Tuesday, December 16, 2003
1:30-**3:00** p.m.
GM Room – Fourth Floor LEC

COURSE APPROVAL FORMS

For December 16, 2003 CoE CC Meeting

AOSS 102 New Course

AOSS 111 Deletion

AOSS 203 Deletion

AOSS 305 Deletion

AOSS 310 Deletion

AOSS 311 Deletion

AOSS 335 Deletion

AOSS 350 New Course

AOSS 380 New Course

AOSS 399 Deletion

AOSS 407 Deletion

AOSS 410 New Course

AOSS 412 Deletion

AOSS 414 Modification – Changing Course Description

AOSS 422 Deletion

AOSS 424 Deletion

AOSS 425 Deletion

AOSS 432 Deletion

AOSS 440 New Course

AOSS 450 New Course

AOSS 454 Deletion

AOSS 461 Deletion

AOSS 460 Deletion

AOSS 466 Deletion

AOSS 470 New Course

AOSS 747 Modification – Changing Title, Changing Description

AOSS 749 Modification – Changing Title, Changing Description

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

Form Number **1258**

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 12/9/2003
Effective Fall 2004

A. CURRENT LISTING

Home Department | Div # | Course Number

Cross Listed Course Information

Course Title

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

Course Description

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

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

Prerequisites ○ Enforced ○ Advised

Credit Restrictions

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

Credit Hours Min Max
Contact Hrs/Wk
Number of Wks

C.

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

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

B. REQUESTED LISTING

Home Department: Atmospheric, Oceanic, & Space Sciences | Div #: AOSS | Course Number: 102

Cross Listed Course Information

Course Title: Extreme Weather

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

Course Description for Official Publication (Max = 50 words)
This course provides an introduction to the physics of extreme weather events. The course uses examples of the thunderstorms, jet stream, floods, lake-effect snowstorms, lightning, thunder, hail, hurricanes, and tornados to illustrate the physical laws governing the atmosphere. Participants apply these principles in hands-on storm forecasting and weather analysis assignments.

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 None ○ Enforced ○ Advised

Credit Restrictions

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

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

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

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

Cognizant Faculty Member: Perry Samson **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 Perry Samson
Cross-listed Dept(s).

Form Number

1258

SUPPORTING STATEMENT

This course provides an introduction to the physics of extreme weather events. Lectures and textbook provide background information on the physics of the atmosphere to support learning through applied problem solving outside of class. The course uses examples of the thunderstorms, jet stream, floods, lake-effect snowstorms, lightning, thunder, hail, hurricanes, and tornados to illustrate the physical laws governing the atmosphere. Participants apply these principles in hands-on storm forecasting and weather analysis assignments.

It is expected that this course will replace AOSS 202, The Atmosphere, as a natural science distribution elective in LS&A. It is anticipated that a move to 100 level will make the course attractive to a wider population of students.

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

Detail the Special requirements

COURSE CONTENT

1. **The Origins of the Atmosphere**
The course begins with the formation of the Earth. How was it that the earth's atmosphere first formed and then became the air we now know and love?

2. **The Atmosphere's Energy Balance** The variability of life forms on the Earth, in fact the existence of life itself, depends upon the type and amount of radiation received from the Sun. What are the characteristics of solar radiation and how is this radiation modified by the Earth's atmosphere? How is the radiation distributed over the Earth and how does this change over the course of the year?

3. **Laws Governing the Atmosphere** Even the atmosphere is constrained by certain laws. What are the laws of the atmosphere and what implication do they have on climate and weather forecasting? How does wind start to blow in the first place? What happens to air once it starts to move? How does the turning of the Earth affect wind direction? How much does the surface slow the air down?

4. **The General Circulation of the Earth** The general flow of the atmosphere dictates where deserts and rain forests exist. This lecture investigates why.

5. **Air Masses and Weather Fronts** The frontal systems so often referred to by TV meteorologists are dividing lines between different air masses. How are these air masses defined? How do fronts form and why is so much precipitation usually associated with them? How do they dissipate? What is the relationship between fronts and the formation of low pressure systems? What's all this got to do with the upper atmosphere?

6. **Surface Weather Maps** The untold key to being a meteorologist is threefold: first you must be able to read the weather codes at weather stations; second, you must be able to draw contour maps from that data; and, third, you must be able to sound calm and confident even when you're frantic and confused. What is the code? Where do the fronts go on the map?

7. **Upper-Air Charts** Much of what happens at the Earth's surface weatherwise is the result of processes occurring higher in the atmosphere. How can we find out what is happening in the upper atmosphere? What are the criteria for deciding that the atmosphere is stable or unstable using this information?

8. **WEATHER FORECASTING** So you think YOU can do better? Here is your chance to shine as weather forecaster. Using knowledge from the course you will be asked to forecast into the future.

9. **Weather Folklore** Long before there were computers sailors and farmers made forecasts based on relationships they deduced from observation. What folklore do you know of? To what degree can we support these relationships based on current scientific understandings?

10. **Cloud Seeding** Sci-fi writers have for years glorified the prospects of humans controlling the weather. What techniques have been and are being used to stimulate/depress precipitation? How successful have these efforts been? What are the prospects for the future?

11. **Convection and Thunderstorms** Some of the most dramatic atmospheric phenomena are associated with convective storms. How do these storms develop? Why are some severe and other mild? What's the difference between a severe storm warning and a watch?

12. **Lightning** What causes hail to form in some thunderstorms? What causes lightning and thunder in some thunderstorms?

13. **Aviation Weather** Weather affects the aviation industry in many ways. What is the clear-air turbulence that causes your coffee to wind up in your lap? What is a microburst and why is it feared?

14. **Tornadoes!!!** Probably the most dramatic atmospheric phenomenon is the tornado. Why do they form? Where are they most apt to form? Where should you go if one is sighted to either (1) seek shelter or (2) get the best possible photograph of the inside of the funnel cloud.

15. **Tropical Weather (Hurricanes)** The weather of the tropics can be a beauty or a beast. How do tropical storms form? Why do some become hurricanes? How well can we predict their movement? How is tropical weather interconnected with weather in the mid-latitudes?

16. **El Niño/La Niña** How is it that the water temperature off the coast of Peru is related to the rainfall amount in California and Australia? How well can we predict these features?

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

Print

Form Number **1227**

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 12/3/2003
Effective Fall 2004

A. CURRENT LISTING

Home Department: Atmospheric, Oceanic, & Space Sciences | Div #: AOSS | Course Number: 111

Cross Listed Course Information:

Course Title: Diving Science and Technology

TITLE ABBREVIATION
Time Sched Max = 19 Spaces: Diving Sci and Tech
Transcript Max = 20 Spaces: Div Sci Tech

Course Description:
Principles and practice of conducting engineering and research operations underwater: Human performance; use of diving equipment; underwater safety; underwater engineering and research techniques. Lecture only.

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: None ○ Enforced ○ Advised

Credit Restrictions:

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

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

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

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

B. REQUESTED 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 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
☐ Undergrad only ☐ All Credit types
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work
☐ Non-Rckhm Grad
☐ Ugrad or Rckhm Grad
☐ Ugrad or Non-Rckhm Grad

Credit Hours: Min ..... Max .....
Contact Hrs/Wk .....
Number of Wks .....

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: Lee Somers Title Lecturer

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 Perry Samson
Cross-listed Dept(s). .....

Form Number

1227

SUPPORTING STATEMENT

Instructor has retired.

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 **1230**

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 12/3/2003
Effective Fall 2004

A. CURRENT LISTING

Home Department: Atmospheric, Oceanic, & Space Sciences | Div #: AOSS | Course Number: 203

Cross Listed Course Information:

Course Title: The Oceans

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

Course Description:
Elementary descriptions of the oceans, their characteristics, and behavior; the sea as a world resource and as a influence on civilizations.

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: None ○ 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

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

B. REQUESTED LISTING

Home Department | Div # | Course Number

Cross Listed Course Information:

Course Title:

TITLE ABBREVIATION
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
☐ 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: .....

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: Lee Somers **Title** Lecturer

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 Perry Samson
Cross-listed Dept(s). _____

Form Number

1230

SUPPORTING STATEMENT

Instructor has retired

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 1234

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 12/5/2003
Effective Fall 2004

A. CURRENT LISTING

Home Department: Atmospheric, Oceanic and Space Sciences | Div #: AOSS | Course Number: 305

Cross Listed Course Information:

Course Title: Introduction to Atmospheric, Oceanic and Space Dynamics

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

Course Description:
Fluid kinematics and thermodynamics; equations of motion; hydrostatic and geostrophic approximations; convective instability; atmospheric boundary layer; Gulf Stream theory; wave motions; barotropic and baroclinic instability; introductory kinetic theory; electromagnetic forces.

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 304, Math 216
○ 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

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

B. REQUESTED LISTING

Home Department | Div # | Course Number

Cross Listed Course Information:

Course Title:

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

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

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

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

Cognizant Faculty Member: Stanley Jacobs **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 Perry Samson
Cross-listed Dept(s). _____

Form Number

1234

SUPPORTING STATEMENT

Eliminated as part of AOSS redesign, material integrated into other 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 1235

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 12/5/2003
Effective Fall 2004

A. CURRENT LISTING

Home Department: Atmospheric, Oceanic, & Space Sciences | Div #: AOSS | Course Number: 310

Cross Listed Course Information:

Course Title: Synoptic Laboratory I

TITLE ABBREVIATION
Time Sched Max = 19 Spaces: Synoptic Lab I
Transcript Max = 20 Spaces: Synop Lab I

Course Description: An introduction to weather observations, analyses, displays, and forecasting.

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 202 or preceded or accdompanied by AOSS 304
○ 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 1 Max 1
Contact Hrs/Wk 3
Number of Wks 14

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

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

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

B. REQUESTED 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 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
☐ Undergrad only ☐ All Credit types
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work
☐ Non-Rckhm Grad
☐ Ugrad or Rckhm Grad
☐ Ugrad or Non-Rckhm Grad

Credit Hours: Min ..... Max .....
Contact Hrs/Wk .....
Number of Wks .....

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: Dennis G. Baker **Title** Professor

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. AOSS Perry Samson
Cross-listed Dept(s). .....

Form Number

1235

SUPPORTING STATEMENT

Instructor retiring

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 **1236**

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 12/5/2003
Effective Fall 2004

A. CURRENT LISTING

Home Department: Atmospheric, Oceanic, & Space Sciences
Div #: AOSS
Course Number: 311

Cross Listed Course Information:

Course Title: Synoptic Laboratory II

TITLE ABBREVIATION
Time Sched Max = 19 Spaces: Synoptic Lab II
Transcript Max = 20 Spaces: Synop Lab II

Course Description:
Analysis of meteorological data in space and time; vertical distribution of different elements in the atmosphere; weather forecasting.

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 310 and preceded or accompanied by AOSS 305
○ 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 2 Max 2
Contact Hrs/Wk: 6
Number of Wks: 14

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

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

B. REQUESTED 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 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
☐ Undergrad only ☐ All Credit types
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work
☐ Non-Rckhm Grad
☐ Ugrad or Rckhm Grad
☐ Ugrad or Non-Rckhm Grad

Credit Hours: Min ..... Max .....
Contact Hrs/Wk:
Number of Wks:

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: Dennis G. Baker
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 Perry Samson
Cross-listed Dept(s). _____

Form Number

1236

SUPPORTING STATEMENT

Instructor retiring

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 **1237**

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 12/5/2003
Effective Fall 2004

A. CURRENT LISTING

Home Department: Atmospheric, Oceanic, & Space Sciences
Div #: AOSS
Course Number: 335

Cross Listed Course Information:

Course Title: Space Science and Spacecraft Applications

TITLE ABBREVIATION
Time Sched Max = 19 Spaces: Space Sci & Appl
Transcript Max = 20 Spaces: Space Sci Ap

Course Description:
The sun, solar radiation and the solar wind. The terrestrial atmosphere and ionosphere; general structure and controlling processes. Aurora and radiation belts. Useful speaccraft orbits, lifetime and causes of decay. Remote sensing principles and the performance of sensor. Representative examples of remote sensing satellites.

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

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

Prerequisites: Junior standing in the College of Engineering
⊙ 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

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

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

Grading
☒ A-E
☐ CR/NC
☐ S/U
☐ P/F
☐ Y

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

B. REQUESTED LISTING

Home Department:
Div #:
Course Number:

Cross Listed Course Information:

Course Title:

TITLE ABBREVIATION
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
☐ 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 .....

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

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

Cognizant Faculty Member: Killeen/Nagy
Title: Professor/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 Perry Samson
Cross-listed Dept(s). .....

Form Number

1237

SUPPORTING STATEMENT

Eliminated as part of AOSS redesign, material integrated into other 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

Form Number **1204**

Action Requested

- (•) New Course
- ( ) Modification of Existing Course
- ( ) Deletion of Course

Complete the following sections:
New Courses - B & C completely
Modifications - A modified information, B & C completely
Deletions - A & C completely

Date 11/5/2003
Effective Fall 2004

A. CURRENT LISTING	B. REQUESTED LISTING
Home Department / Div # / Course Number	Home Department: Atmospheric, Oceanic, & Space Sciences / Div #: AOSS / Course Number: 350
Cross Listed Course Information	Cross Listed Course Information
Course Title	Course Title: Atmospheric Physics I
TITLE ABBREVIATION — Time Sched Max = 19 Spaces; Transcript Max = 20 Spaces	TITLE ABBREVIATION — Time Sched Max = 19 Spaces: Atmos Physics I; Transcript Max = 20 Spaces: Atmos Physics I
Course Description	Course Description for Official Publication (Max = 50 words): Fundamentals of radiative transfer, thermodynamics, and cloud physics of the atmosphere, including absorption, emission, and scattering of radiation, energy balance, adiabatic processes, entrophy, water-air systems, and the cloud condensation, microphysics and precipitation processes.
PROGRAM OUTCOMES: ☐a ☐b ☐c ☐d ☐e ☐f ☐g ☐h ☐i ☐j ☐k	**PROGRAM OUTCOMES:** ☒a ☐b ☐c ☐d ☒e ☐f ☒g ☐h ☐i ☒j ☒k
Degree Requirements: ○ Degree Requirement ○ Tech Elective ○ Core Course ○ Other ○ Free Elective	Degree Requirements: ○ Degree Requirement ○ Tech Elective (•) Core Course ○ Other ○ Free Elective
Prerequisites: ○ Enforced ○ Advised	Prerequisites: Math 216 (•) 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	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	Credit Hours Min: 4 Max: 4; Contact Hrs/Wk: 4; Number of Wks: 14
C. Repeatability (Indl 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: Sushil K. Atreya; 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 Perry Samson
Cross-listed Dept(s). _____

Form Number

1204

SUPPORTING STATEMENT

A knowledge of the fundamentals of radiative transfer, thermodynamics, and cloud physics is essential to atmospheric and environmental sciences in particular, and earth system science and engineering, in general. This course will introduce the students to the essential physics of the atmosphere. By combining into one single course the basic and most important aspects of radiative transfer, thermodynamics, and cloud physics, the course will serve a dual purpose – it would avoid repetition of some material as was the case in the former (AOSS) course structure, and it would expose the student to the fundamental aspects of the field in depth and breadth early on without having to take several specialized courses. The principles and formulations developed in the course will be applied to problems of the atmosphere.

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

Detail the Special requirements

Atmospheric Physics I
Fall 2004
Class Time and Place: TBD
Professor Sushil K. Atreya
atreya@umich.edu
Office Hours: Wednesdays: 12:30-1:30 PM or by appointment

Course Outline

1. Review of Composition, and Thermal Structure of the Earth's Atmosphere and Oceans, Atmospheric Statics including Gas Laws, Hydrostatic Equation, and Lapse Rates (3 weeks)

2. Solar Spectrum, Blackbody Radiation, Absorption, Emission, and Scattering of Radiation, in the Atmosphere, Beers Law (1.5 weeks)

3. Radiative Transfer Equation for scattering and absorption and gray body approximations (2 weeks)

4. Law of Conservation of Energy, Internal Heat, Adiabatic Processes for Ideal Gas, Tropospheric Energy Balance (2 weeks)

5. Entrophy, Internal Energy and Enthalpy (1.5 weeks)

6. Latent Heat, Variation with Temperature, Saturation, Condensation, Moist Adiabats (1.5 weeks)

7. Dew and Frost Points, Adiabatic Isobaric Mixing, Adiabatic Ascent and Mixing, Minima and Maxima in Temperatures (1.5 weeks)

8. Exams and Reviews (1 week)

Course Grading Scheme

One Mid-Term Exam of 1.5 hours	40%
One Final Exam of 1.5 hours	40%
Homework	20%

Course Reading Material

Will consist of a combination of coursepack, and certain chapters from the following recommended books:

1. Atmospheric Science, J. M. Wallace and P. V. Hobbs, Academic Press.
2. Atmospheric Thermodynamics, J. V. Iribarne and W. L. Godson, Kluwer Publishers.
3. Atmospheric Thermodynamics, C. F. Bohren and B. A. Albrecht, Oxford University Press.

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

Print

Form Number 1211

Action Requested

◉ New Course
○ Modification of Existing Course
○ Deletion of Course

Complete the following sections:
New Courses - B & C completely
Modifications - A modified information, B & C completely
Deletions - A & C completely

Date 11/17/2003
Effective Fall 2004

A. CURRENT LISTING	B. REQUESTED LISTING
Home Department / Div # / Course Number	Home Department: Atmospheric, Oceanic, & Space Sciences / Div #: AOSS / Course Number: 380
Cross Listed Course Information	Cross Listed Course Information
Course Title	Course Title: Atmospheric Physics II
TITLE ABBREVIATION — Time Sched Max = 19 Spaces; Transcript Max = 20 Spaces	TITLE ABBREVIATION — Time Sched Max = 19 Spaces: Atmos Physics II; Transcript Max = 20 Spaces: Atmos Physics II
Course Description	Course Description for Official Publication (Max = 50 words): A continuation of Atmospheric Physics I; will include topics from kinetic theory, radiative transfer for non-grey atmospheres, and cloud microphysics and dynamics.
PROGRAM OUTCOMES: ☐a ☐b ☐c ☐d ☐e ☐f ☐g ☐h ☐i ☐j ☐k	**PROGRAM OUTCOMES:** ☒a ☐b ☐c ☒d ☐e ☐f ☒g ☒h ☐i ☒j ☒k
Degree Requirements ○ Degree Requirement ○ Tech Elective ○ Core Course ○ Other ○ Free Elective	**Degree Requirements** ○ Degree Requirement ○ Tech Elective ◉ Core Course ○ Other ○ Free Elective
Prerequisites ○ Enforced ○ Advised	Prerequisites AOSS 350 ◉ Enforced ○ Advised
Credit Restrictions	Credit Restrictions
Level of Credit ☐ Undergrad only ☐ All Credit types ☐ Rackham Grad ☐ Rckhm Grad w/add'l Work ☐ Non-Rckhm Grad ☐ Ugrad or Rckhm Grad ☐ Ugrad or Non-Rckhm Grad; Credit Hours Min / Max; Contact Hrs/Wk; Number of Wks	**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: William R. Kuhn; 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 Perry Samson
Cross-listed Dept(s). _____

Form Number

1211

SUPPORTING STATEMENT

This course is part of the core program of the new joint program with L.S.A. in Earth System Science and Engineering. Concepts from physics will be covered in this course that are relevant to the climate system and will be used in later courses in integrating the components of the system.

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

Detail the Special requirements

Course Objectives (of the instructor)

1. Introduce students to the kinetic theory of gases with topics relevant to the terrestrial atmosphere.
2. Introduce spectroscopy for radiational transitions in molecules, electronic, vibrational , rotational.
3. Derive radiative transfer equation and appropriate solutions for the atmosphere.
4. Illustrate the various clouds and the associated nomenclature
5. Explain the growth of cloud droplets in the atmosphere
6. Explain warm and cold cloud processes.
7. Explain how climate is affected by clouds.

Course Outcomes (the student will…)

1. 1.Have a basic understanding of the velocity and speed distributions of ideal gases.
2. Be able to calculate thermal diffusion in soils.
3. Be able to understand line spacings and intensities for molecular transitions.
4. Solve simple problems for solutions generated from the radiative transfer equation.
5. Be able to identify clouds.
6. Solve problems for the growth of cloud droplets.
7. Explain warm and cold cloud processes.
8. Explain how climate is affected by clouds.

Assessment Tools

1. Written homework assignments
2. Two mid-term exams
3. Final exam

Course Outline
Atmospheric Physics II

Weeks 1 through 3: Kinetic theory of gases with application to the terrestrial system; kinetic theory of an ideal gas, distribution of molecular velocities, diffusion and thermal conductivity, Brownian motion and density fluctuations.

Weeks 4 through 8: radiative transfer of non-grey atmospheres; spectra of rotational, vibrational, electronic, dissociative and ionization transitions; radiative transfer equation for absorption, emission, and scattering processes; line broadening, transmittances, applications to the Earth's atmosphere for clear skies

Weeks 9 through 13: cloud physics: cloud identification and morphology; aerosols; growth of a droplet (Kelvin and Kohler equations); warm and cold cloud processes; effects on solar and thermal radiation in the atmosphere and climate.

One week for midterms and review.

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

Print

Form Number 1239

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 12/8/2003
Effective Fall 2004

A. CURRENT LISTING

Home Department	Div #	Course Number
Atmospheric, Oceanic, & Space Sciences	AOSS	399

Cross Listed Course Information:

Course Title: Weather Rorecasting Practicum

TITLE ABBREVIATION		
Time Sched Max = 19 Spaces	Wea Fcstg Prac
Transcript Max = 20 Spaces	WxFcst Prac

Course Description:
Students gain valuable forecasting experience through daily - 30 minutes of weather discussions, forecasting for different US cities and participation in a yearly National Collegiate Weather Forecasting Contest (NCWFC). Students should elect this course during consecutive Fall and Winter Semesters to be eligible for NCWFC ranking.

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: Permission of Instructor ○ Enforced ⊙ Advised

Credit Restrictions:

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

Credit Hours: Min 1 Max 1
Contact Hrs/Wk 2
Number of Wks 14

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

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

Graded Section: ○ Lec ○ Rec ○ Sem ○ Lab ⊙ Dis ○ Ind ○ Other _

Grading: ☒ A-E ☐ CR/NC ☐ S/U ☐ P/F ☐ Y

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

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

B. REQUESTED 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 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
☐ Undergrad only ☐ All Credit types
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work
☐ Non-Rckhm Grad
☐ Ugrad or Rckhm Grad
☐ Ugrad or Non-Rckhm Grad

Credit Hours: Min ..... Max .....
Contact Hrs/Wk .....
Number of Wks .....

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: Peter J. Sousounis **Title** Associate Professor

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. AOSS Perry Samson
Cross-listed Dept(s). .....

Form Number

1239

SUPPORTING STATEMENT

Eliminated as part of AQSS redesign.

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 1240

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 12/8/2003
Effective Fall 2004

A. CURRENT LISTING

Home Department: Atmospheric, Oceanic, & Space Sciences | Div #: AOSS | Course Number: 407

Cross Listed Course Information:

Course Title: Mathematical Methods in Geophysics

TITLE ABBREVIATION
Time Sched Max = 19 Spaces: Math Method Geophys
Transcript Max = 20 Spaces: Math Methods

Course Description:
Vector calculus and Cartesian tensors; Sturm-Liouville systems, Green's functions, and solution of boundary value problems; Fourier series, Fourier and Laplace transforms, discrete Fourier transform, fast Fourier transofrms, and energy spectra.

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: Math 216
○ Enforced ◉ Advised

Credit Restrictions:

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

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

C.

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

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

B. REQUESTED 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 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
☐ Undergrad only ☐ All Credit types
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work
☐ Non-Rckhm Grad
☐ Ugrad or Rckhm Grad
☐ Ugrad or Non-Rckhm Grad

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

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

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

Cognizant Faculty Member: Stanley Jacobs **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 Perry Samson
Cross-listed Dept(s). .....

Form Number

1240

SUPPORTING STATEMENT

Instructor has retired

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 **1202**

Action Requested

- (•) New Course
- ( ) Modification of Existing Course
- ( ) Deletion of Course

Complete the following sections:
New Courses - B & C completely
Modifications - A modified information, B & C completely
Deletions - A & C completely

Date 11/4/2003
Effective Fall 2004

A. CURRENT LISTING	B. REQUESTED LISTING
Home Department / Div # / Course Number	Home Department: Atmospheric, Oceanic, & Space Sciences / Div #: ~~241~~ AOSS / Course Number: 410
Cross Listed Course Information	Cross Listed Course Information
Course Title	Course Title: Earth System Modeling
TITLE ABBREVIATION — Time Sched Max = 19 Spaces	Earth System Model
TITLE ABBREVIATION — Transcript Max = 20 Spaces	Earth System Modeling
Course Description	Course Description for Official Publication (Max = 50 words): Introduction to Earth System Modeling; Discussion of energy balance models, carbon cycle models, and atmospheric chemistry models with multiple time scales; Methods for numerical solution and practice building and analyzing results from models.
PROGRAM OUTCOMES: ☐a ☐b ☐c ☐d ☐e ☐f ☐g ☐h ☐i ☐j ☐k	**PROGRAM OUTCOMES:** ☒a ☒b ☒c ☐d ☐e ☐f ☒g ☒h ☐i ☒j ☒k
Degree Requirements O Degree Requirement O Tech Elective O Core Course O Other O Free Elective	**Degree Requirements** O Degree Requirement O Tech Elective (•) Core Course O Other O Free Elective
Prerequisites O Enforced O Advised	Prerequisites AOSS 320, AOSS 321 (•) Enforced O 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 Min / Max; Contact 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 Min 4 / Max 4; Contact Hrs/Wk 5; Number of Wks 14
C. Repeatability (Indi Research, Dir. Study, Dissertation): Is this course repeatable? O Yes (•) No; Maximum Hours? ; Maximum Times? ; Can it be repeated in the same term? O Yes O 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 O Rec O Sem O Lab O Dis O Ind O 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; Half term ☐ 1st ☐ 2nd; ■ Yearly ☐ Alter Years ☐ Even Years ☐ Odd Years
	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 Perry Samson
Cross-listed Dept(s). _____

Form Number

1202

SUPPORTING STATEMENT

Earth System Science recognizes the importance of proper coupling of the components of the climate system and their interactions for prediction of future changes to the system. Moreover climate prediction is based on numerical models with a number of simplifying assumptions. The emergence of a number of new departments that focus on Earth System Science as their entire curriculum in some of the best Universities in the country (Georgia Tech, University of California, emerging programs at Cal Tech) requires that the University of Michigan participate in this new endeavor if they are to remain current and competitive. This course will give students practical experience in building and coupling some simplified components of the Earth System.

This course will be appropriate to a Senior level undergraduate or a first year graduate student. Prerequisites within the new Earth System Science and Engineering undergraduate curriculum include Evolution of Earth Systems, Earth System Dynamics, Earth System Analysis, Atmospheric Physics I and Atmospheric Physics II.

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

Detail the Special requirements

Computer lab needed to teach the lab portion of this course.

Course Objectives:

1. Introduce students to the concepts of feedbacks and their consequences to Earth System prediction.
2. Introduce basic concepts in numerical analysis (accuracy; stability) and their consequences for modeling various systems
3. Give students a basic understanding of matlab and how to use it for analysis and programming
4. Equip students with a general knowledge of the most important Earth System components and how they work
5. Familiarize students with the basic tools needed to analyze numerical results from different Earth System components
6. Introduce students to climate modeling

Course Outcomes:

1. Have a basic understanding of Earth System Components and Feedbacks
2. Have an introductory understanding of numerical concepts
3. Have an ability to build a simple numerical model
4. Be able to analyze feedbacks and model behavior;
5. Be able to use simple models to study the consequences of GHG emissions

Assessment Tools:

1. Written lab assignments with some homework
2. Midterm exam
3. Final project

Earth System Modeling

Week	Lecture topics	Lab topics	Homework/exams
1	Interactive cycles and feedbacks	Using Stella to explore a "daisy world" model; intro to C cycle model	
2	Introduction to Carbon cycle modeling	Using Stella to explore a carbon cycle box model	
3	Introduction to Energy balance modeling	Using Stella to explore an energy balance models	Lab write-up on carbon cycle modeling due
4	Numerical concepts: finite difference schemes	Matlab: programming in Matlab; graphing in Matlab	
5	Numerical concepts: accuracy, stability	Matlab: programming in Matlab; graphing in Matlab	Lab write-up on energy balance modeling due
6	Energy balance models: feedbacks and forcings	Hands-on experience in building an energy balance model (single box model)	
7	Carbon cycle models: Feedbacks and representations in models	Building a carbon cycle (multiple box) model for both short term variations and long term variations	Homework 1 due: covering topics of numerical concepts
8	Atmospheric chemistry and multiple time scales	Completion of carbon cycle model and multiple time scale simulations	Lab write-up on their energy balance model due Mid-term exam
9	Numerical concepts: Advection: centered schemes, upwind schemes, effects on species concentrations of different strategies	Application of a 1-D atmospheric chemistry model to explore feedbacks between CH_4 and OH and effects on CH_4 lifetime.	Lab write-up on their carbon cycle model due
10	Numerical concepts: Treatment of diffusion; model analysis of accuracy	Building a 1-D model of advection and diffusion over topography	Lab write-up on application of a 1-D atmospheric chemistry model
11	Two-dimensional energy balance models: concepts and numerical treatments	Application of 2-dimensional energy balance model with atmosphere component only to understanding seasonal cycle and latitudenal variations	Lab write-up on 1-D model of advection and diffusion

12	Two-dimensional ocean models: concepts and numerical treatment	Two-dimensional energy balance model: applications with ocean and sea ice	Lab write-up on 2-D model simulations of atmospheric variations due
13	Parameterizations in general circulation models: convection	Final project preparation	Lab write-up on 2-D model simulations of coupled atmosphere and ocean model
14	3-D models and chaotic behavior	Final project preparation	Final project due

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

Form Number **1242**

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 12/8/2003
Effective Fall 2004

A. CURRENT LISTING

Home Department: Atmospheric, Oceanic, & Space Sciences
Div #: AOSS
Course Number: 412

Cross Listed Course Information:

Course Title: Dynamics of Climate

TITLE ABBREVIATION		
	Time Sched Max = 19 Spaces	Dynamics of Climate
	Transcript Max = 20 Spaces	Dyn Climate

Course Description:
Climate fluctuations and change; paleo and historical climates; contruction of climatic models; and the climatic implications of human activity.

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: Permission of Instructor
○ Enforced ◉ Advised

Credit Restrictions:

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

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

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

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

B. REQUESTED 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 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
☐ Undergrad only ☐ All Credit types
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work
☐ Non-Rckhm Grad
☐ Ugrad or Rckhm Grad
☐ Ugrad or Non-Rckhm Grad

Credit Hours: Min ..... Max .....
Contact Hrs/Wk:
Number of Wks:

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: William R. Kuhn
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 Perry Samson
Cross-listed Dept(s). .....

Form Number

1242

SUPPORTING STATEMENT

Eliminated as part of AOSS redesign, material integrated into other 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

Form Number **1198**

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 10/31/2003
Effective Fall 2004

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
Identification and description of significant weather systems from satellite imagery and from data sources. These systems are examined further through application of theoretically derived dynamical concepts to datasets from actual events. A range of phenomena including mid-latitude cyclones, hurricanes, lake-effect storms, and tornadoes will be addressed.

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 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 #: ~~241~~ AOSS | Course Number: 414

Cross Listed Course Information

Course Title: Weather Systems

TITLE ABBREVIATION — Time Sched Max = 19 Spaces: Weather Systems; Transcript Max = 20 Spaces: Weather Sys.

Course Description for Official Publication (Max = 50 words)
Introduction to the basic characteristics, thermodynamics, and dynamics of atmospheric weather systems on Earth and other planets. The students are exposed to observations of weather systems while reviewing non-dimensional analysis, dynamics and thermodynamics. Weather systems on earth are compared to that of other planets and analytical tools are used to gain insights into their basic physics.

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 350 or AOSS 401 ○ 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

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: Nilton Renno **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. AOSS Perry Samson
Cross-listed Dept(s). _____

Form Number

1198

SUPPORTING STATEMENT

Comparative atmospheric sciences provide a powerful tool for the understanding of the atmosphere of the earth and other planets. It gives a sense of perspective to investigations of the evolution of planetary atmospheres, global climate change, atmospheric chemistry, atmospheric convection, and atmospheric dynamics. We use simple analytical tools to quantitatively study atmospheric circulations and weather systems on earth and other planets. We focus on studies of terrestrial circulations and weather systems, and comparisons between them and weather sytems from Venus, Mars, and Jupiter.

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

Detail the Special requirements

Weather Systems
AOSS 414
Fall 2004

Professor: Nilton O. Renno
Office: 1541 Space Research Building
Phone: (734) 936-0488
Email: nrenno@umich.edu

Course Goals:
To provide students with a background on the basic characteristics, thermodynamics, and dynamics of atmospheric weather systems on Earth and other Planets.

Class Hours and Location:
Tuesdays and Thursdays from 9:00 am to 10:30 am
Space Research Building, Room TBD

Office Hours:
Tuesdays and Thursdays from 10:40 am to 11:50 am
Any other time by appointment

Required Textbook:
None, class notes will be provided.

Useful Textbooks:
Physical Fluid Dynamics *by D. J. Tritton*
Atmospheric Convection *by Kerry A. Emanuel*
Theory of Planetary Atmospheres *by Joseph W. Chamberlain and Donald M. Hunten*
Mesoscale Meteorology *by Peter S. Ray*
The New Solar System *by J. Kelly Beatty and Andrew Chaikin, editors*

Prerequisites:
AOSS 305 (Introduction to Atmospheric and Oceanic Dynamics)

Tests:
The main objectives of the tests are:
(i) To measure the students' ability to use the knowledge acquired in the course;
(ii) To provide feedback to the teacher on how well the course's long-range objectives are being achieved.

Final Examination:
(i) The final examination can be replaced by a term paper;
(ii) Graduate students are encouraged to write a term paper.

Missed Test:
Except for the final examination, a missed test will not be accounted for. However, the missed test will have to be turned in as homework (one week after the test date) and your final grade will be determined by the grades of the completed tests, final examination, and homework only.

Homework:
Homework grades will be reduced by at least 10% for any homework turned in after the due date. After the answer sheet is handed out (usually one week after the due date) 50% of the grade will be deducted from a late homework. It is absolutely *not* permitted to consult answer sheets for help. Some collaboration on doing homework is encouraged, but not too much. When in doubt, write an honest note at the top of your assignment saying who you worked with and how much. Rule of thumb: < ¼ of your effort may be jointly if you don't mention a collaborator, < ½ if you do mention the collaborator. The write-up must be entirely your own.

Final Grade:
To compute the final score the lowest grade in the surprise quizzes (SQZ) will be eliminated.

The final score will be computed by

$$\text{SCORE} = 0.25\ (\text{HMW} + \text{SQZ} + \text{QZ} + \text{FEX}),$$

except if SQZ < QZ. In this case, the grade of the surprise quizzes will be eliminated and the final score will be computed by

$$\text{SCORE} = 0.25\ (\text{HMW} + \text{QZ}) + 0.50\ \text{FEX}.$$

The final grade will be based on the grading displayed scale below.

Score	Grade
90-100	A
80-90	B
65-80	C
50-65	D
< 50	E

Complaints about Grades:
I will go over the test of any student who brings a written paragraph describing his/her concerns. However, the review might affect the grade either positively or negatively.

In Class Participation:
The mastering of the basic concepts and ideas to be presented in this course requires the students to participate actively in class. Therefore, I expect students to be active and ask and answer questions during lectures.

Tentative Course Outline:

1. Background
1.1 Planetary atmospheres
1.2 Dynamic similarity
1.3 Overview of weather systems
1.4 How are weather systems driven?
1.5 A brief review of thermodynamics
1.6 A brief review of dynamics

2. General principles and governing equations
2.1 Buoyancy acceleration and CAPE
2.2 The Navier-Stokes equation
2.3 The Boussinesq and Anelastic approximations
2.4 The energy and Bernoulli equations
2.5 Summary of the governing equations

3. Convective systems
3.1 Natural convection as a heat engine
3.2 Dry convection, dust devils, and Martian dust storms
3.3 Non precipitating moist convection (observations and theory)
3.4 Thunderstorms and Terrestrial dust storms
3.5 Waterspouts, tornadoes, and hurricanes
3.6 Mesoscale weather systems (squall lines, dry lines, sea-land breezes)
3.7 Global circulations (Hadley-Walker, Ferrel, polar)

4. Numerical weather prediction
4.1 Short range forecasting techniques
4.2 A brief overview of numerical weather prediction
4.3 Predictability of weather and climate
4.4 Parameterization of physical processes
4.5 A brief overview of data assimilation techniques

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

Print

Form Number **1244**

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 12/8/2003
Effective Fall 2004

A. CURRENT LISTING

Home Department: Atmospheric, Oceanic, & Space Sciences
Div #: AOSS
Course Number: 422

Cross Listed Course Information:

Course Title: Micrometeorology I

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

Course Description:
Physical processes responsible for the thermal and moisture conditions in the air layer near the ground. Components of net radiation exchange, heart transfer in soil, wind structure and turbulence near the ground, turbulent transfer of sensible heat and water vapor, evapotranspiration; forest climatology, transitional microclimates.

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: Phys 240 or Math 215 or permission of iinstructor
○ Enforced ◉ Advised

Credit Restrictions:

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

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

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

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

B. REQUESTED 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 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
☐ Undergrad only ☐ All Credit types
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work
☐ Non-Rckhm Grad
☐ Ugrad or Rckhm Grad
☐ Ugrad or Non-Rckhm Grad

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

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

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

Cognizant Faculty Member: Donald Portman
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 Perry Samson
Cross-listed Dept(s).

Form Number

1244

SUPPORTING STATEMENT

Instructor has retired

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 1245

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 12/8/2003
Effective Fall 2004

A. CURRENT LISTING

Home Department: Atmospheric, Oceanic, & Space Sciences | Div #: AOSS | Course Number: 424

Cross Listed Course Information:

Course Title: Mesometeorology

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

Course Description:
An introduction to mesometeorological phenomena including organized convection, thunderstorms, tornadoes, foehns, lee waves, orographic blocking, sea breezes, urban heat islands, and effects from the Great Lakes.

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 305 or AOSS 401
○ Enforced ◉ Advised

Credit Restrictions:

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

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

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

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

B. REQUESTED 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 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
☐ Undergrad only ☐ All Credit types
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work
☐ Non-Rckhm Grad
☐ Ugrad or Rckhm Grad
☐ Ugrad or Non-Rckhm Grad

Credit Hours: Min ..... Max .....
Contact Hrs/Wk:
Number of Wks:

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: Dennis Baker **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 Perry Samson
Cross-listed Dept(s). .....

Form Number

1245

SUPPORTING STATEMENT

Instructor retiring

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

[redacted]

Form Number **1246**

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 12/8/2003
Effective Fall 2004

A. CURRENT LISTING

Home Department: NAVACH — Div #: NAVA — Course Number: 425

Cross Listed Course Information: Atmospheric, Oceanic, & Space Sciences — AOSS 425

Course Title: Environmental Ocean Dynamics

TITLE ABBREVIATION — Time Sched Max = 19 Spaces: Env Ocean Dyn — Transcript Max = 20 Spaces: Env Ocean Dy

Course Description:
Physical conditions and physical processes of the oceans; integration of observations into comprehensive descriptions and explanations of oceanic phenomena. Emphasis on wave and current prediction, optical and acoustical properties of sea water, currents, tides, waves and pollutant transport.

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

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

Prerequisites: NA 320 or AOSS 305 or CEE 325
○ 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

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

B. REQUESTED LISTING

Home Department: Div #: Course Number:

Cross Listed Course Information:

Course Title:

TITLE ABBREVIATION — 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
☐ Undergrad only ☐ All Credit types
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work
☐ Non-Rckhm Grad
☐ Ugrad or Rckhm Grad
☐ Ugrad or Non-Rckhm Grad

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

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: Guy A. Meadows — 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. NAVACH - ALREADY DELETED
Cross-listed Dept(s). AOSS Perry Samson

Form Number

1246

SUPPORTING STATEMENT

Course number was changed from AOSS 425 to AOSS 420. AOSS 425 was not deleted at that time.

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 **1248**

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 12/8/2003
Effective Fall 2004

A. CURRENT LISTING

Home Department: Atmospheric, Oceanic, & Space Sciences
Div #: AOSS
Course Number: 432

Cross Listed Course Information:

Course Title: Environmental Radiative Processes

TITLE ABBREVIATION
Time Sched Max = 19 Spaces: Env Radiat Proc
Transcript Max = 20 Spaces: Env Rad Proc

Course Description:
The nature of electromagnetic radiation. Solar and terrestrial radiation. The transfer of radiation including absorption, emission and scattering. Radiation and climate. Satellite observations and remote sounding.

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: Math 216, Physics 240
○ 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

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

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

B. REQUESTED 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 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
☐ 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:

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: S. Roland Drayson **Title** Professor

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. AOSS Perry Samson
Cross-listed Dept(s). _____

Form Number

1248

SUPPORTING STATEMENT

Eliminated as part of AOSS redesign, material integrated into other 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

Form Number **1166**

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 10/3/2003
Effective Fall 2004

A. CURRENT LISTING

Home Department | Div # | Course Number

Cross Listed Course Information

Course Title

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

Course Description

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

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

Prerequisites ( ) Enforced ( ) Advised

Credit Restrictions

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

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

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

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

B. REQUESTED LISTING

Home Department: Atmospheric, Oceanic, & Space Sciences | Div #: ~~241~~ AOSS | Course Number: 440

Cross Listed Course Information

Course Title: Meteorological Analysis Laboratory

TITLE ABBREVIATION — Time Sched Max = 19 Spaces: Meteor Analysis Lab; Transcript Max = 20 Spaces: Meteor Analysis Lab

Course Description for Official Publication (Max = 50 words)
This course provides an introduction into the analysis of both surface-based and remotely-sensed meteorological data. The development and application of operational numerical forecast models will be discussed. Techniques for the prediction of both synoptic and mesoscale meteorological phenomena will also be presented.

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 350, AOSS 401
( ) Enforced ( ) Advised

Credit Restrictions

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

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

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

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

Cognizant Faculty Member: Frank J. Marsik **Title** Asst. Res. Sci.

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 Perry Samson
Cross-listed Dept(s). ____

Form Number

1166

SUPPORTING STATEMENT

This course represents the synthesis of material covered in the following courses, which are scheduled to be deleted from the curriculum: AOSS 310, AOSS 311, and AOSS 454

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

Detail the Special requirements

PROPOSED NEW COURSE
AOSS 440: Meteorological Analysis Laboratory
Course Instructor: Dr. Frank J. Marsik

Course Justification:

The study of meteorology and climate at the University of Michigan dates back to the 1850's. These early studies in meteorology and climate were focused on the application of this knowledge to the areas of agriculture and maritime shipping, both of which were important economic sectors. Since that time, the development of a fundamental understanding of meteorology and climate has proven to be important in relation to a number of newer disciplines, including:

- Air Pollution
- Architecture and urban planning
- Aviation
- Civil and environmental engineering
- Land-surface processes
- Climate change

Currently, the Department of Atmospheric, Oceanic and Space Sciences is restructuring its program to better position itself to contribute to the emerging disciplines of Earth System Science and Global Climate Change. To this end, it became necessary to streamline our academic curriculum to allow the students adequate opportunity to take courses in these important emerging disciplines. Despite this proposed modification of our curriculum, the Department of Atmospheric, Oceanic and Space Sciences continues to recognize the importance of providing our students with a basic knowledge of synoptic and mesoscale meteorological analysis and forecasting. A basic understanding of these latter subjects is essential to understanding the driving forces associated with our climate system. Under our new proposed curriculum, this course will represent the synthesis of the previously offered courses, all of which would be deleted under the proposed curriculum: AOSS 310, AOSS 311 and AOSS 454.

Likelihood of Success:

It is our feeling that the newly developed course, AOSS 440: Meteorological Analysis Laboratory, will have a high likelihood of success. A review of our current undergraduate student body indicates that there continues to be a strong interest in the topics to be covered in the proposed new course. At this time, we expect that this interest level will be maintained and even expanded as we develop stronger ties both within the College of Engineering and with other academic units within the University, as a whole.

Additionally, efforts are also underway to enhance the educational experience of potential students of this course through the development of ties with both governmental and industry sectors. We have a commitment from the local NOAA-National Weather Service Forecast Office (Pontiac/White Lake, MI) to develop cooperative efforts to provide students with access to "state-of-the-art" analysis tools and other academic

opportunities. We will also be attempting to develop similar ties with local utility and other private sectors. In short, we feel that such collaborations will make this course both appealing and relevant to students both academically and in the respective careers.

Course Pre-Requisites:

In order for students to perform well and to get the most out of the information presented within this proposed course, it will be necessary for the students to possess a basic understanding of thermodynamics and fluid dynamics. Students from within the Department of Atmospheric, Oceanic and Space Sciences, students will be required to have taken the Atmospheric Physics I and Geophysical Fluid Dynamics courses. Students from outside of the Department of Atmospheric, Oceanic and Space Sciences could be successful in this course if they have taken thermodynamics and fluid dynamics courses within their own subject disciplines.

Grading and Exam Details:

The final course grades will be determined using the following guidelines:

Midterm Exam	20%
Final Exam	30%
Homework	30%
Term Project	20%

The Midterm Exam will cover the material presented during Weeks 1-6. The Final Exam will cover material presented during Weeks 7-13. Homework will not be assigned weekly, but will be assigned in a manner that will enhance the students' comprehension of key topic areas. It is anticipated that approximately five homework assignments will be given during the course of the term. Finally, the Term Project will be a group project, with the students being separated into groups of 2-3 students. The students will be required to perform a case study analysis of a significant weather event (hurricane, severe convective storm, winter storm or air pollution event), with the grade being based upon both a final report and presentation to the class. It is felt that this will not only provide an opportunity to apply the knowledge gained during the course, but it will also help students to learn group-working and presentation skills that will be necessary regardless of their future career choice areas.

Subject Areas to be Covered:

This subject areas to be presented in the proposed course will provide the students with the ability to utilize a vast array of meteorological data types in the analysis and prediction of both synoptic and mesoscale meteorological phenomena. As a result, the course topics will be relevant to students who are considering careers in both forecast meteorology, as well as other atmospheric and/or environmental fields. A weekly syllabus for the proposed course is presented on the following page.

Proposed Course Outline
AOSS 440: Meteorological Analysis Laboratory
Winter Term, Junior Year

Week #	Topics Covered**
1	**Meteorological surface observations/measurement systems** - Manual and automated systems, related uncertainties and data gaps (spatial and temporal)
2	**Remotely-sensed observation/measurements systems** - Basic remote sensing principles, data processing and related uncertainties
3	**Surface Data Analysis** - Interpretation of coded data (METAR, SAO, and Synoptic Codes)
4	**Surface Data Analysis** - Surface data plotting and analysis, computer applications
5	**Upper Air Data Analysis** - Interpretation of coded data (TTAA, TTBB, TTCC and TTDD) plotting and analysis of constant level data
6	**Upper Air Data Analysis** - Interpretation of coded data, plotting and analysis of vertical profile data
7	**Satellite Data Interpretation** - Enhancement curves and cloud/feature identification
8	**Satellite Data Interpretation** - Derived products (e.g., rainfall estimation) and use in forecasting; MIDTERM EXAM
9	**Radar Data Interpretation** - Comparison of radars, WSR-88D display/analysis/derived products
10	**Numerical Weather Prediction Models** - Model assumptions and development of primary forecast models
11	**Numerical Weather Prediction Models** - Interpretation and analysis of model output and derived products
12	**Weather Forecasting Techniques** - Application of observational and model derived data for prediction of synoptic-scale phenomena - Surface/upper-air connection, divergence and vorticity, thermal advection and cyclogenesis
13	**Weather Forecasting Techniques** - Application of observational and model derived data for prediction of mesoscale phenomena - Severe convective storms, lake effect snow
14	**Significant Weather Case Studies: Term Project Presentations** - Hurricanes, Sever Convective Storms and Winter Storms; FINAL EXAM

Note: Weather forecasting techniques will be covered throughout the term during weekly weather briefings/map discussions.

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

Form Number **1199**

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 10/31/2003
Effective Fall 2004

A. CURRENT LISTING

Home Department | Div # | Course Number

Cross Listed Course Information

Course Title

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

Course Description

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

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

Prerequisites ( ) Enforced ( ) Advised

Credit Restrictions

Level of Credit
☐ Undergrad only ☐ 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

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

B. REQUESTED LISTING

Home Department: Atmospheric, Oceanic, & Space Sciences | Div #: ~~241~~ AOSS | Course Number: 450

Cross Listed Course Information

Course Title: Geophysical ElectroMagnetics

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

Course Description for Official Publication (Max = 50 words)
The fundamentals of electricity, magnetism, and electrodynamics in the context of the Earth. The first segment will cover electrostatics, the electric structure and circuit of the Earth, electricity in clouds, and lightning. The second segment will cover magnetostatics, currents, the magnetic field and magnetic dynamo of the Earth, and the Earth's magnetosphere. The third segment will cover electrodynamics, electromagnetic waves, lightning dynamics, magnetic storms, solar irradiation, and types of radiation in the Earth environment.

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: 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 4 Max 4
Contact Hrs/Wk 4 Number of Wks 14

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

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

Cognizant Faculty Member: R. Paul Drake **Title** Professor

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. AOSS Perry Samson
Cross-listed Dept(s). ____

Form Number

1199

SUPPORTING STATEMENT

Electric and magnetic phenomena play an essential role in the Earth system environment. There is a steady flow of current through the atmosphere. The magnetosphere protects us from cosmic radiation while the ionosphere is an essential feature of the upper atmosphere. Electrodynamic phenomena have important consequences – magnetic storms can knock out our power grids, while lightning on the one hand ignites fires but on the other hand may be a dominant contributor to global nitrous oxide production. If one hopes to understand the Earth system, and perhaps to contribute to deeper knowledge of it, and especially to the interaction of the Earth and space, one must have a fundamental grasp of electric and magnetic phenomena. This course will enable the students to attain this grasp, learning in the process much about electric and magnetic phenomena in the Earth system environment.

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

Detail the Special requirements

Course Objectives

1. Present the fundamentals of electricity, magnetism, and radiation at a level suitable for advanced undergraduates.
2. Introduce students to the basic mechanisms responsible for electric and magnetic effects in the Earth system.
3. Introduce students to electrostatic phenomena that occur in the Earth system and to the mathematical description of these phenomena
4. Introduce students to magnetic phenomena that occur in the Earth system and to the mathematical description of these phenomena.
5. Introduce students to radiative phenomena that occur in the Earth system and to the mathematical description of these phenomena.
6. Familiarize students with standard models of the Earth magnetic field

Course Outcomes

1. Have a basic understanding of electrostatics and its application to Earth system phenomena
2. Have a basic understanding of magnetism and its application to Earth system phenomena
3. Have a basic understanding of radiation and an awareness of its importance in Earth system phenomena
4. Be aware of ways in which electrodynamic effects can interact with other aspects of the Earth system

AOSS 450

Geophysical E&M

Instructor
Prof. R. Paul Drake
R 1420, Space Research Building
Email: rpdrake@umich.edu
Course website: http://coursetools.ummu.umich.edu/...

Grader **Office Hours:**

Lectures
2:00 am to 4:00 pm Tuesday, Thursday
Space Research Building, Room 2246.
The lecture material is the heart of the class, and it is to your advantage to attend regularly.

Reading Assignments
The class will use one text and a course pack, so we can cover both fundamental electricity and magnetism and its earth system applications

The text is: Introduction to ElectroDynamics, by David J. Griffiths
There is also a course pack.

Supplementary texts have been placed on reserve at the Media Union Library. These include:

Lightning, by Uman, Martin A.
The lightning discharge, by Uman, Martin A.
The electrical nature of storms by Donald R. MacGorman, W. David Rust.
Introduction to Geomagnetic Fields by Wallace H. Campbell

Prof. Drake Office Hours
Private meetings in my office (R1420, Space Research)
Wednesdays 2 pm to 4 pm or by appointment

Grading

30% problem sets (weekly)
20% midterm 1
20% midterm 2
20% final exam

Grading notes:
(a) Strong class participation can raise your overall grade by up to a half point.
(b) Grading is not on a curve. It is based on demonstration of capability.

Problem Sets

There will be weekly problem sets throughout the course of the semester which account for a total of 30% of the final grade. Problem sets are all due on Thursdays by the beginning of class.
Due Dates for problem sets:

Midterm exam

There will be closed book midterms on **A and B**. They will each account for 20% of the final grade. One 8.5 inch by 11 inch page of notes (two sides) will be allowed. You are expected to bring your own paper on which to answer the exam questions.

Final exam

The final exam will also be closed book. It will account for 25% of the final grade. One 8.5 inch by 11 inch page of notes (two sides) will be allowed. You are expected to bring your own paper on which to answer the exam questions. The date and time of the exam are **unknown**

AOSS 450 Geophysical Electricity and Magnetism
Course Conduct Statement

Prof. R.P. Drake; rpdrake@umich.edu

The College of Engineering has an honor code.
This is taken seriously.

see http://www.engin.umich.edu/college/bulletin/59-92/71.html

Policy on Homework Preparation

You are encouraged to form study groups to work on homework problems and to study in other ways. You are allowed to consult with other students during the conceptualization of a problem. However, all written work, whether in scrap or final form, is to be generated by you alone. You are not allowed to possess, look at, use, or in anyway derive advantage from the existence of solutions prepared in prior years, whether these solutions were former students' work product or copies of solutions that had been made available by others.

Policy on Exams

You are to complete all examinations on your own, with only benefit of the allowed aids that you yourself have prepared, and without looking or talking about at the examination work of others.

Violation of this policy is grounds for me to initiate an action that would be filed with the Dean's office and would come before the Honor Council of the College of Engineering. If you have any questions about this policy, PLEASE do not hesitate to contact me.

Syllabus Geophysical ElectroMagnetism

Week	Tuesday hour 1	Tuesday hour 2	Thursday hour 1	Thursday hour 2
1	Course overview	Electric Fields	Electric Fields	Atmos. Charges, ionos.
1		Griffiths 2.1	Griffiths 2.2	M&R 1
2	Electric Potential	Elec Work & Energy	Conductors/Capacitors	Earth electric circuit
2	Griffiths 2.3	Griffiths 2.4	Griffiths 2.5	M&R 1
3	Lightning phenomenology	Lightning electricity	Laplace's Equation	Separation of Variables
3	Uman	various	Griffiths 3.1	Griffiths 3.3
4	Multipoles	Polarization	Fields and polarization	Dielectrics
4	Griffiths 3.4	Griffiths 4.1	Griffiths 4.2	Griffiths 4.3 & 4.4
5	Nonstorm cloud electricity	Storm cloud electricity	Review	Discuss homework
5	M&R 2	M&R 3		
6	Mid-term exam 1	Mid-term exam 1	Lorentz Force	Bio-Savart Law
6			Griffiths 5.1	Griffiths 5.2
7	Earth B and dynamo	Earth Magnetosphere	Div and Curl B	Vector potentials
7	various	various	Griffiths 5.3	Griffiths 5.4
8	Magnetization	Fields of objects	H	Ferromagnetism
8	Griffiths 6.1	Griffiths 6.2	Griffiths 6.3	Griffiths 6.4

9 Earth's crustal field 9 various	Standard field models various	Review	Discuss homework
10 Mid-term exam 2 10	Mid-term exam 2	Ohm's Low Griffiths 7.1	Lightning 2, Heating Uman
11 EM induction 11 Griffiths 7.2	Magnetic storms various	Maxwell 1 Griffiths 8.1	Maxwell 2 Griffiths 8.2
12 EM waves 1 12 Griffiths 9.1	EM waves 2 Griffiths 9.2	Lightning 4, radiation	EM waves in matter Griffiths 9.3
13 EM waves in matter 13 Griffiths 9.4	Earth radiation types various	Radiation around Earth various	Lightning sprites, fireballs
14 Instrumentation 14 M&R 6	Observations of storms M&R 7	Review	Review

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

[redacted]

Form Number **1170**

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 10/6/2003
Effective Fall 2004

A. CURRENT LISTING

Home Department: Atmospheric, Oceanic, & Space Sciences
Div #: ~~241~~ AOSS
Course Number: 454

Cross Listed Course Information:

Course Title: Weather Analysis and Forecasting Laboratory

TITLE ABBREVIATION
Time Sched Max = 19 Spaces: Weather Anal Lab
Transcript Max = 20 Spaces: Weather Lab

Course Description:
Principles of meteorological analysis. Structure of wave cyclones and fronts; vorticity; divergence; vertical velocity; quasi-geostrophic theory and diagnostics; cyclogenesis and frontogenesis. Description of operational numerical models and facsimile products. Daily weather discussion and forecasting.

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 311 or preceded or accompanied by AOSS 414.
○ Enforced ◉ Advised

Credit Restrictions:

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

Credit Hours: Min 3 Max 3
Contact Hrs/Wk: 9
Number of Wks: 14

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

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

B. REQUESTED 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 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
☐ Undergrad only ☐ All Credit types
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work
☐ Non-Rckhm Grad
☐ Ugrad or Rckhm Grad
☐ Ugrad or Non-Rckhm Grad

Credit Hours: Min ..... Max .....
Contact Hrs/Wk: .....
Number of Wks: .....

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: Dennis Baker
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 Perry Samson
Cross-listed Dept(s). _____

Form Number

1170

SUPPORTING STATEMENT

This course will be replaced by AOSS 440

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 **1253**

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 12/8/2003
Effective Fall 2004

A. CURRENT LISTING

Home Department: Atmospheric, Oceanic, & Space Sciences
Div #: AOSS
Course Number: 460

Cross Listed Course Information:

Course Title: Satellite Meteorology

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

Course Description:
Topics selected from: Characteristics of meteorological satellite orbits and of instruments used for the measurement of meteorological parameters using visible, infrared and microwave radiation. Application of satellite measurements to earth's radiation balance and albedo, surface temperature, atmospheric temperature structure, cloud heights and types, minor atmospheric constituents, aerosols and precipitation, winds and circulation.

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: Permission of Instructor
○ Enforced ◉ Advised

Credit Restrictions:

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

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

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

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

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

B. REQUESTED 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 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
☐ Undergrad only ☐ All Credit types
☐ Rackham Grad ☐ Rckhm Grad w/add'l Work
☐ Non-Rckhm Grad
☐ Ugrad or Rckhm Grad
☐ Ugrad or Non-Rckhm Grad

Credit Hours: Min ..... Max .....
Contact Hrs/Wk: .....
Number of Wks: .....

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: Fred L. Bartman
Title: Professor

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. AOSS Perry Samson
Cross-listed Dept(s). _____

Form Number

1253

SUPPORTING STATEMENT

Eliminated as part of AOSS redesign, material integrated into other 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 1254

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 12/8/2003
Effective Fall 2004

A. CURRENT LISTING

Home Department	Div #	Course Number
Atmospheric, Oceanic, & Space Sciences	AOSS	461

Cross Listed Course Information:

Course Title: Meteorological Instrumentation for Air Pollution Studies

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

Course Description:
Analysis of meteorological factors that affect dispersion directly and indirectly. Guidelines in selecting wind speed, wind direction, turbulence, temperature and humidity measuring instruments. Significance of rate of response of sensors. Methods of measuring these parameters above the heights of towers. Methods of measuring diffusion by tracer experiments, both visible and invisible. Wind tunnel modeling of urban 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

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	Credit Hours Max	Contact Hrs/Wk	Number of Wks
2	2	2	14

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

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

B. REQUESTED 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 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
☐ 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	Credit Hours Max	Contact Hrs/Wk	Number of Wks

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: Fred Bartman **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 Perry Samson
Cross-listed Dept(s). _____

Form Number

1254

SUPPORTING STATEMENT

Eliminated as part of AOSS redesign, material integrated into other 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

Form Number **1257**

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 12/9/2003
Effective Fall 2004

A. CURRENT LISTING

Home Department: Geological Sciences | Div #: GEOS | Course Number: 466

Cross Listed Course Information: Atmospheric, Oceanic, & Space Sciences | AOSS | 466

Course Title: Computational Models of Geochemical Processes

TITLE ABBREVIATION
Time Sched Max = 19 Spaces: Geochemical Models
Transcript Max = 20 Spaces: Geochem Mod

Course Description:
Computational models of the processes that govern the composition of ocean and atmosphere. Geochemical reservoirs, mechanisms of transfer, chemical interactions, and feedback processes. The impact of organisms on the global environments Geological history of atmospheric and oceanic composition.

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

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

Prerequisites: Ability to program in BASIC
○ Enforced ⊙ Advised

Credit Restrictions:

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

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

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

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

B. REQUESTED LISTING

Home Department | Div # | Course Number

Cross Listed Course Information

Course Title

TITLE ABBREVIATION
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
O Degree Requirement O Tech Elective
O Core Course O Other
O Free Elective

Prerequisites
○ Enforced ○ Advised

Credit Restrictions:

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

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

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: James C.G. Walker **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. GEO SCI -SEE ATTACHED, ALREADY DELETED
Cross-listed Dept(s). AOSS Perry Samson

Form Number

1257

SUPPORTING STATEMENT

Home department already deleted as the Deans office deletes courses inactive for at least 10 years.

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

Detail the Special requirements

COURSE APPROVAL REQUEST FORM

UNIVERSITY OF MICHIGAN

College of Literature, Science, & the Arts
Rackham School of Graduate Studies

To : LSA Curriculum Committee
2522 LSA Bldg 1382,

or Course Approval Officer
1004 Rackham 1070.

Action Requested:
- ◉ **Deletion of Existing Course**
- ○ **Modification of Existing Course**
- ○ **New Course**

For Office Use
Received
2/1/2002
Office of the Dean
College of LS&A

Date of Submission: 2/1/2002

Effective Term: **Fall 2002**

CURRENT LISTING	REQUESTED LISTING
Home Department *Subject (Division)* *Course Number*	*Home Department (Owner)* **Geological Sciences** *Subject (Division)* **GEOSCI** *Course Number* **466**
Cross-listing (if applicable) *Department* *Subject (Div)* *Course Number*	*Cross-listing (if applicable)* *Department* **AOSS** *Subject (Div)* **AOSS** *Course Number* **466**
Course Title	*Course Title* **Computational Models of Geochemical Processes.**
	Credit Hours — *Undergrad* *Min* / *Max*; *Rackham* *Min* / *Max* *Full Term*: 3 / 3; 3 / 3 *Half Term*: 3 / 3; 3 / 3
	Supporting Statement Dean's office deleting courses inactive for at least 10 years unless department requests otherwise.

Approval

- ☒ **Indefinite**
- ☐ **One Term Only**

		Date
cc	P. Moran	1/22/2002
xc	B. Owen	1/29/2002
rack	X Aim Hoed (signature)	

Approval of Department Chair(s)	*Date*
Joel Blum, Chair	*12/1/2001*
Lennard Fisk, AOSS	*12/15/2001*
Amy Ronehan (signature)	5/7/02

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

Form Number **1201**

Action Requested

- (•) New Course
- ( ) Modification of Existing Course
- ( ) Deletion of Course

Complete the following sections:
New Courses - B & C completely
Modifications - A modified information, B & C completely
Deletions - A & C completely

Date 11/4/2003
Effective Fall 2004

A. CURRENT LISTING

Home Department | Div # | Course Number

Cross Listed Course Information

Course Title

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

Course Description

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

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

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

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 #: ~~241~~ AOSS | Course Number: 470

Cross Listed Course Information

Course Title: Solar Terrestrial Relations

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

Course Description for Official Publication (Max = 50 words)
Introduction to solar terrestrial relations with an overview of solar radiation and its variability on all time-scales. We then discuss effects of this variability on the middle and upper atmosphere, and the Earth near space environment, particularly focusing on energetic particle radiation.

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 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 4 Max 4

Contact Hrs/Wk 5 Number of Wks 14

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

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

Cognizant Faculty Member: Thomas H. Zurbuchen **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. AOSS Perry Samson
Cross-listed Dept(s). ____

Form Number

1201

SUPPORTING STATEMENT

This class deals with one of the most important aspects of global change, the Sun and its variability. It is even conceivable that solar variability plays a role in altering weather and climate at some level of significance. During the last twenty years, monitoring of the Sun and the Earth has yielded new knowledge essential to this highly political issue – the Sun as an agent of global change.

This class will discuss key aspects of the solar-terrestrial interaction that is currently being pursued and are relevant to this debate. After a short introduction into the Sun and its atmosphere, it will address how the radiative energy from the Sun changes over long time-scales, down to time-scales of years. It then focuses on the variability of the UV and EUV radiation, and its important consequences on the middle and upper atmosphere. This variability also changes the energetic particle output from the Sun, and the shielding effect of the heliosphere that protects us from cosmic rays.

The AOSS curriculum does not currently contain any class dealing with solar-terrestrial relations on this scale.

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

Detail the Special requirements

Course Objectives:

1. Introduce basic physics of the interior of the Sun.
2. Introduce principles of solar dynamo on the resulting solar cycle.
3. Introduce students to basic physics of coronal physics and heliosphere connections.
4. Familiarize students with observational evidence of the solar cycle, the spectral irradiance changes, and their temporal dependences.
5. Equip students with general knowledge of the effects of this radiation in the middle and upper atmosphere.
6. Familiarize students with observations of the heliosphere and the energetic particle environment.
7. Equip students with fundamental concepts of the interactions of this radiation with the upper atmosphere.
8. Experience the relation of the solar variability and Earth system correlation studies by performing relevant data studies using public data-sets from NOAA, NASA and other data sources.

Course Outcomes:

1. Have basic understanding of variability of the spectral irradiance of the Sun.
2. Understand the basic principles of the solar corona as a source of the Earth space environment.
3. Know the most important effects of the spectral irradiance on the Earth atmosphere.
4. Know the most important effects of the partiscular radiation on the Earth atmosphere.
5. Demonstrate these dependences using case-studies and data analysis.

Assessment Tools

1. Written homework for individuals and small groups.
2. Mid-term exam
3. Final Exam

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

[redacted]

Form Number **1232**

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 12/5/2003
Effective Fall 2004

A. CURRENT LISTING

Home Department | Div # | Course Number

Cross Listed Course Information

Course Title

TITLE ABBREVIATION		
	Time Sched Max = 19 Spaces	Atm Sci & Env Sem
	Transcript Max = 20 Spaces	Atm Sci Sem

Course Description
Student and faculty presentations about current research results, research papers, and new ideas related to our atmospheric environment. Each enrolled student will give a presentation.

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 None ○ 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 1 Max 1
Contact Hrs/Wk 1
Number of Wks 14

C.
Repeatability (Indi Research, Dir. Study, Dissertation:
Is this course repeatable? ◉ Yes ○ No
Maximum Hours? 6 Maximum Times? 6
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: 747

Cross Listed Course Information

Course Title: AOSS Student Seminar

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

Course Description for Official Publication (Max = 50 words)
Students take turns presenting short research seminars (20 minutes) and/or short talks introducing upcoming speakers in AOSS 749. Some class time will also be devoted to discussions of effective oral and poster presentations and professional ethics.

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 None ○ 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 1 Max 1
Contact Hrs/Wk 1
Number of Wks 14

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

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

Cognizant Faculty Member: Mary Anne Carroll **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 Perry Samson
Cross-listed Dept(s).

Form Number

1232

SUPPORTING STATEMENT

In the past this seminar featured a mix of presentations by students and faculty. The revised AOSS 749 is now the setting for faculty research presentations. This seminar will now focus on student presentations and effective communication of research results in oral and poster presentations.

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 **1231**

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 12/5/2003
Effective Fall 2004

A. CURRENT LISTING	B. REQUESTED LISTING
Home Department:	Home Department: Atmospheric, Oceanic, & Space Sciences
Div #:	Div #: AOSS
Course Number:	Course Number: 749
Cross Listed Course Information:	Cross Listed Course Information:
X Course Title: Space Science Seminar	Course Title: Atmospheric and Space Science Seminar
TITLE ABBREVIATION — Time Sched Max = 19 Spaces: Space Science Sem	TITLE ABBREVIATION — Time Sched Max = 19 Spaces: A and S Seminar
TITLE ABBREVIATION — Transcript Max = 20 Spaces: Space Sci Se	TITLE ABBREVIATION — Transcript Max = 20 Spaces: A and S Seminar
X Course Description: Student and faculty presentations about current research results, classic research papers and new ideas.	Course Description for Official Publication (Max = 50 words): Presentations from UM researchers and outside speakers about current research results, covering a broad range of topics in atmospheric and space science. In this class students take turns serving as seminar chair. Questions from students will be handled before those from faculty. Conditions for credit are participation in this seminar, and the completion of a short paper in which each student follows up on one talk given as part of this seminar series.
PROGRAM OUTCOMES: ☐a ☐b ☐c ☐d ☐e ☐f ☐g ☐h ☐i ☐j ☐k	**PROGRAM OUTCOMES:** ☒a ☐b ☐c ☐d ☐e ☐f ☒g ☐h ☒i ☒j ☐k
Degree Requirements ◉ Degree Requirement ○ Tech Elective ○ Core Course ○ Other ○ Free Elective	**Degree Requirements** ◉ Degree Requirement ○ Tech Elective ○ Core Course ○ Other ○ Free Elective
Prerequisites None ○ Enforced ○ Advised	Prerequisites None ○ 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	**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:	Credit Hours Min: 1 Max: 1
Contact Hrs/Wk:	Contact Hrs/Wk: 1
Number of Wks:	Number of Wks: 14
C. Repeatability (Indi Research, Dir. Study, Dissertation): Is this course repeatable? ◉ Yes ○ No; Maximum Hours? 6; Maximum Times? 6; 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: Thomas H. Zurbuchen; 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. AOSS Perry Samson
Cross-listed Dept(s). _____

Form Number

1231

SUPPORTING STATEMENT

This difference in focus of this class will allow all students across AOSS to be able to have insight into modern research in Atmospheric and Space science. It will be combined with a student seminar, AOSS 747.

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

Detail the Special requirements