

SPACE 370: Solar-Terrestrial Relations

Fall 2024

Instructor:

Professor Shasha Zou
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Lectures:

Regular: 1:30 pm to 3:30 pm, Monday-Wednesday, 2238 CSRB

Instructor Office Hours:

2:30 - 3:30 pm, Tuesday, 1431 CSRB

Reading Materials:

- Lecture slides
- “Understanding Space Weather and the Physics Behind It,” by Delores J. Knipp
<https://spacetechnologyseries.com/books/Space-Weather.html>
<https://search.lib.umich.edu/catalog/record/990117225870106381>

Grading Apportionment:

Midterm Exam #1	20% (covering the Sun)
Midterm Exam #2	20% (covering Sun-space weather relations)
Final Exam	20% (comprehensive)
Homework	20% (four homework assignments)
Project	20% (analyzing a space weather event)

Grading Breakdown:

A+	97%
A	93%
A-	90%
B+	87%
B	83%
B-	80%
C+	77%
C	73%
C-	70%
D+	67%
D	63%
D-	60%

SPACE 370 Syllabus:

Milestone Dates:

Midterm Test #1: Sep. 30

Fall Break: Oct.14-15, no class

Midterm Test #2: Nov. 6

Thanksgiving Break: Nov. 27, project work time, no live lecture

Project Presentations: Dec. 2 and 4

Final Exam: Dec. 9

Project Written Reports: Dec. 13

Projects: Space Weather analysis

There will be one term project for this class, done individually. They will be assigned in mid October (more details at that time). The project is to describe and analyze a space weather event. You will be assigned a particular day and will be responsible for looking up relevant data to determine the solar source, magnetosphere and ionosphere responses, middle atmosphere response if any and whether aurora was seen in Ann Arbor. I will provide a list of possible projects from which you can choose.

Grading will consist of a written report and oral presentation to the class. The report should be on the order of 8 pages. Each presentation will be around 15 minutes plus a couple of minutes question time.

The project will require you to find all applicable and relevant data sets and conduct some meaningful, quantitative data analysis calculations. The report should include background on this topic, descriptions of the data and explanations of their relevance, and a thorough analysis of your results. Figures of the data discussed in the report should be included.

Extra Credit: near or on the final exam

There will be a chance for extra credit throughout the semester and at the very end of the class, including department seminar attendance, a separate assignment or extra questions on the final exam. These will be worth up to a few percent towards your overall course grade.

SPACE 370 Course Outline (Fall 2024, **tentative**)

Date	#	Topic	Due Date	Reading
M Aug 26	1	Introduction and Solar interior		K2, K3.1
W Aug 28	2	Documentary and reflection		
M Sep 2		Labor day, No class		
W Sep 4	3	Solar atmosphere		K3.2, 4.3, 9.1
M Sep 9	4	Solar magnetic field	HW #1 Due	K3.3
W Sep 11	5	Solar wind		K5.1, 9.1-9.2, 10.1-10.2
M Sep 16	6	Solar and solar wind data		K5, K9, K10
W Sep 18	7	Heliospheric disturbances	HW #2 Due	K9.3, 10.3
M Sep 23	8	Solar energetic particles		K9.3, 10.3
W Sep 25	9	Review and Q&A for exam #1		
M Sep 30	10	Midterm Test #1 (in class, room 2238)	Exam	
W Oct 2	11	Geomagnetism; project assignments		K7.1-7.2
M Oct 7	12	Magnetospheric circulation		K6.4, 7.4, 11.1
W Oct 9	13	Magnetospheric circulation cont.	HW #3 Due	K6.4, 7.4, 11.1
M Oct 14		Fall study break, No class		
W Oct 16	14	Charged particle motion in geospace		K6.1-6.2, 7.2-7.3
M Oct 21	15	Charged particle motion cont.		K6.1-6.2, 7.2-7.3
W Oct 23	16	Project work time, no live lecture		
M Oct 28	17	Inner magnetosphere		K7.2.2, 7.4.3, 11.1
W Oct 30	18	Current systems	HW #4 Due	K4.4, 11.3
M Nov 4	19	Review and Q&A for exam #2		
W Nov 6	20	Midterm Test #2 (in class, room 2238)	Exam	
M Nov 11	21	Ionosphere and thermosphere		K8, K12.3
W Nov 13	22	Ionosphere and thermosphere cont.		K8, K12.3
M Nov 18	23	Space weather impact #1		K13, K14
W Nov 20	24	Space weather impact #2		K13, K14
M Nov 25	25	Space weather impact #3; project Q&A		K13, K14
W Nov 27	26	Project work time, no live lecture		
M Dec 2	27	Project presentations		
W Dec 4	28	Project presentations		
M Dec 9		Final Exam, room 2238, 1:30-3:30 pm	Exam	
F Dec 13		Project written report due by midnight		

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Course Conduct Statement

Prof. Shasha Zou shashaz@umich.edu

The College of Engineering has an honor code. This is taken seriously.
See the website: <https://ecas.engin.umich.edu/honor-council/honor-code/>

Policy on Homework

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.

Unless arrangements are made with me beforehand, late homework will be accepted but marked down 10%, until the time when the graded homework assignments are returned to the students. At this point, submissions for that assignment will no longer be accepted.

Policy on Exams

You are to complete all examinations on your own, with only benefit of the allowed aids, and without looking at or talking about the examination work of others. If you see a violation of the Honor Code, then you are obligated to report it.

On each exam, the Honor Pledge will be printed and you should sign your name under it. The Honor Pledge is as follows:

"I have neither given nor received unauthorized aid on this examination, nor have I concealed any violations of the Honor Code."

The Honor Council policy is that I am not required to grade tests in which the signed Honor Pledge does not appear. The Honor Code remains enforced whether or not the student signs the Pledge.

The Honor Code mandates that exams be given without proctors in the room. Therefore, after the tests are distributed, the proctor (which may or may not be me) will write on the board where he/she will be during the exam. If you have questions, then find the proctor and ask for clarification. If the proctor deems that this answer is relevant to everyone, the answer will be written on the board for all to see the proctor will occasionally come in to notify the class of the time remaining. When you are done, please hand your test to the proctor.

Violations

Violation of this policy is grounds for the initiation of a report filed with the Dean's office and the case 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.

Accommodations for Students with Disabilities

If you think you need an accommodation for a disability, please let me know at your earliest convenience. As soon as you make me aware of your needs, we can work with the Services for Students with Disabilities (SSD) office to help us determine appropriate academic accommodations. SSD (734-763-3000; <http://ssd.umich.edu>) typically recommends accommodations through a Verified Individualized Services and Accommodations (VISA) form. Any information you provide is private and confidential and will be treated as such.