

# SPACE 370: Solar-Terrestrial Relations

## Fall 2023

### Instructor:

Professor Shasha Zou  
Room 1431, Climate and Space Research Building  
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### Lectures:

Regular: 1:00 pm to 3:00 pm, Monday-Wednesday, 2424 CSRB

### Instructor Office Hours:

2:00 - 3:00 pm, Tuesday, 1431 CSRB

### Reading Materials:

- “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>
- Lecture slides

### 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: Oct. 2  
Fall Break: Oct.16-17, no class  
Midterm Test #2: Nov. 6  
Thanksgiving Break: Nov. 22-24, no class  
Project Presentations: Nov. 27 and 29  
Final Exam: Dec. 6  
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 2023, tentative)

Date	#	Topic	Due Date	Reading
M Aug 28	1	Introduction		
W Aug 30	2	Solar interior		K2, K3.1
M Sep 4		<b>Labor day, No class</b>		
W Sep 6	3	Solar atmosphere		K3.2, 4.3, 9.1
M Sep 11	4	Solar magnetic field		K3.3
W Sep 13	5	Solar wind	HW #1 Due	K5.1, 9.1-9.2, 10.1-10.2
M Sep 18	6	<b>Travel, No class</b>		
W Sep 20	7	Solar and solar wind data		K5, K9, K10
M Sep 25	8	Heliospheric disturbances		K9.3, 10.3
W Sep 27	9	Solar energetic particles; Review for exam #1	HW #2 Due	K9.3, 10.3
M Oct 2	10	<b>Midterm Test #1</b> (in class, room 2424)	<b>Exam</b>	
W Oct 4	11	Geomagnetism; project assignments		K7.1-7.2
M Oct 9	12	Magnetospheric circulation		K6.4, 7.4, 11.1
W Oct 11	13	Magnetospheric circulation cont.		K6.4, 7.4, 11.1
M Oct 16		<b>Fall study break, No class</b>		
W Oct 18	14	Charged particle motion in geospace	HW #3 Due	K6.1-6.2, 7.2-7.3
M Oct 23	15	Charged particle motion cont.		K6.1-6.2, 7.2-7.3
W Oct 25	16	<b>Travel, No class</b>		
M Oct 30	17	Inner magnetosphere		K7.2.2, 7.4.3, 11.1
W Nov 1	18	Review for exam #2		
M Nov 6	19	<b>Midterm Test #2</b> (in class, room 2424)	<b>Exam</b>	
W Nov 8	20	Current systems		K4.4, 11.3
M Nov 13	21	Ionosphere and thermosphere		K8, K12.3
W Nov 15	22	Space weather impact #1	HW #4 Due	K13, K14
M Nov 20	23	Space weather impact #2		K13, K14
W Nov 22		<b>Thanksgiving break, No class</b>		
M Nov 27	24	Project presentations		
W Nov 29	25	Project presentations		
M Dec 4	26	Review for final exam		
W Dec 6		<b>Final Exam, room 2424, 1-3 pm</b>	<b>Exam</b>	
W Dec 13		<b>Project written report due by 5pm</b>		

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## Course Conduct Statement

Prof. Shasha Zou      shashaz@umich.edu

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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.