SPACE 495: Ionosphere and Upper Atmosphere

- **Instructor:**

Dr. Shasha Zou, Professor
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- **Lecture, Exam Times and Office Hours**:
  - Lectures: Tuesday and Thursday 09:30 am - 11:30 am in 1003 EECS
  - Midterm: Feb 22, regular class time
  - Office hours: Wednesday 2:00-3:00pm, CSRB 1431
- **Books**:
  - Primary: ***Ionospheres: Physics, Plasma Physics, and Chemistry***
    by Robert Schunk and Andrew Nagy, second edition.
    https://www-cambridge-org.proxy.lib.umich.edu/core/books/ionospheres/8DFCEBAED2001F5DCD7CEF42784B6F24
  - Optional: ***The Earth's Ionosphere: plasma physics and electrodynamics***
    by Michael Kelley, 2009
    https://www-sciencedirect-com.proxy.lib.umich.edu/book/9780124040137/the-earths-ionosphere

- **Grading Apportionment:**

Homework	40%
Midterm	30%
Project	30%

- **Grading Breakdown:**

A+	95%	B	75%
A	90%	B-	70%
A-	85%	C+	65%
B+	80%	C	60%
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- **Project:**
  - There will be one term project for this class, done individually. It will be assigned after the midterm (more details at that time).
  - Grading will consist of a written report and oral presentation to the class. The written report should be on the order of 6 pages without figures and references (Letter size paper, single column, font size 12 (Times or similar)). The oral presentation will be around 12 minutes plus 1-2 minutes Q&A.

- **Tentative course schedule:**

Week	Date	Lecture	Topic	Chapter	HW	HW Due
1	Jan 11, Th	1	Motivation and Background	1-2		
2	Jan 16, Tu	2	Transport equation	3,5	HW1	
2	Jan 18, Th	3	Conference, no class			
3	Jan 23, Tu	4	Collision processes	4		
3	Jan 25, Th	5	Chemical Processes	8	HW2	HW1
4	Jan 30, Tu	6	Chemical Processes cont.	8		
4	Feb 1, Th	7	Electron and Ion Energy Exchange	9	HW3	HW2
5	Feb 6, Tu	8	Electron and Ion Energy Exchange cont.	9		
5	Feb 8, Th	9	Homework #1 and #2 review			HW3 (Feb. 9)
6	Feb 13, Tu	10	Neutral atmospheres	10	HW4	
6	Feb 15, Th	11	Neutral atmospheres cont.	10		HW4 (Feb. 19)
7	Feb 20, Tu	12	Q&A session, prepare for mid-term			
7	Feb 22, Th	13	Mid-term			
8	Feb 27-29		Winter break			
9	Mar 5, Tu	14	Low-latitude ionosphere	11		
9	Mar 7, Th	15	Low-latitude ionosphere	11		
10	Mar 12, Tu	16	Mid-latitude ionosphere	11		
10	Mar 14, Th	17	High-latitude ionosphere (convection)	12	HW5	
11	Mar 19, Tu	18	High-latitude ionosphere (ion-neutral coupling)	12		
11	Mar 21, Th	19	High-latitude ionosphere (particle precipitation)	12		HW5
12	Mar 26, Tu	20	High-latitude ionosphere (MI coupling)	12		
12	Mar 28, Th	21	Impact of geomagnetic disturbances on IT system 1	11-12		
13	Apr 2, Tu	22	Impact of geomagnetic disturbances on IT system 2	11-12		
13	Apr 4, Th	23	Feedback of IT to magnetosphere	11-12		

14	Apr 9-11, Tu		**Conference, no class**			
15	Apr 16, Tu	**24**	Space weather threats in the IT system	**13**		
15	Apr 18, Th	**25**	**Project presentation**			
16	Apr 23, Tu	**26**	**Project presentation**			
16	Apr 26, Fr		**Written report due**			

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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.