

SPACE 495: Ionosphere and Upper Atmosphere

- **Instructor:**

Dr. Shasha Zou, Associate Professor

Office: Climate & Space Research Building 1431

Email: shashaz@umich.edu

Office phone: 734-936-8184

- **Lecture, Exam Times and Office Hours:**

- Lectures: Tuesday and Thursday 09:30 am - 11:30 am in CSRB 2238
- Midterm: February 27th, regular class time
- Office hours: Thursday 2:00-3:00pm or by appointment, in CSRB 1431

- **Books:**

- Primary:
 - ***Ionospheres: Physics, Plasma Physics, and Chemistry***
by Robert Schunk and Andrew Nagy, second edition.
- Optional:
 - ***The Earth's Ionosphere: plasma physics and electrodynamics***
by Michael Kelley, 2009
 - ***The high-latitude ionosphere and its effects on radio propagation***
by R. D. Hunsucker, 2002
- All the books are available online in the University of Michigan library

- **Grading Apportionment:**

Homework 35%

Midterm 30%

Project 35%

- **Grading Breakdown:**

A+ 95%

A 90%

A- 85%

B+ 80%

B 75%

B- 70%

C+ 65%

C 60%

- **Project:**

- There will be one term project for this class, done individually. It will be assigned in early February (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 10 pages without figures and references. The oral presentation will be around 15-20 minutes. The written report will be due on April 24th.

- **Tentative course schedule:**

- There will be a couple of lecture cancelations due to travels for conferences and reviews. Make-up lectures will be scheduled later in the semester depending on progress.

Week	Date	Lecture	Topic	Chapter	HW	HW Due
1	Jan 9, Th	1	Motivation and Background	1-2		
2	Jan 14, Tu	2	Transport equation	3,5	HW1	
	Jan 16, Th		No class			
3	Jan 21, Tu	3	Collision processes	4		
	Jan 23, Th	4	Neutral atmospheres	10	HW2	HW1
4	Jan 28, Tu	5	Neutral atmospheres cont.	10		
	Jan 30, Th	6	Chemical Processes	8		
5	Feb 4, Tu	7	Chemical Processes cont.	8	HW3	HW2
	Feb 6, Th	8	Electron and Ion Energy Exchange	9		
6	Feb 11, Tu	9	Electron and Ion Energy Exchange	9	HW4	HW3
	Feb 13, Th	10	Conductivity	5		
7	Feb 18, Tu	11	Low-latitude ionosphere (equatorial dynamics)	11		
	Feb 20, Th	12	Low-latitude ionosphere (equatorial bubbles)	11		HW4
8	Feb 25, Tu	13	Mid-latitude ionosphere	11		
	Feb 27, Th	14	Mid-term			
9	Mar 3, Tu		Winter break			
	Mar 5, Th		Winter break			
10	Mar 10, Tu	15	High-latitude ionosphere (convection)	12	HW5	
	Mar 12, Th	16	High-latitude ionosphere (ion-neutral coupling)	12		

11	Mar 17, Tu		No class			
	Mar 19, Th		No class			
12	Mar 24, Tu	17	High-latitude ionosphere (particle precipitation)	12		HW5
	Mar 26, Th	18	High-latitude ionosphere (MI coupling)	12		
13	Mar 31, Tu	19	How to build an IT model (by Dr. Aaron Ridley)			
	Apr 2, Th	20	High-latitude ionosphere (Density irregularities)	12		
14	Apr 7, Tu	21	Impact of geomagnetic disturbances on IT system	11-12		
	Apr 9, Th	22	Feedback of IT system during geomagnetic disturbances	11-12		
15	Apr 14, Tu	23	Planetary Ionospheres (by Dr. Steven Bougher)	13		
	Apr 16, Th	24	Class project presentation			
16	Apr 21, Tu	25	Class project presentation			
	Apr 24, F		Written report due			

SPACE 495: Ionosphere and Upper Atmosphere Course Conduct Statement

Prof. Shasha Zou shashaz@umich.edu

The College of Engineering has an honor code. This is taken seriously.
See the website: <http://www.engin.umich.edu/students/honorcode/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.