

SPACE 477: Space Weather Modeling Winter 2021

Course Syllabus

Course Objectives:

Students will develop a general understanding of numerical modeling for space physics applications, learning the different mathematical and numerical approaches, the implicit and explicit assumptions, and the different types and purposes of models. The student will develop familiarity in building and running models including large-scale community models. The student will become familiar with the models available online, especially those at NASA's Community Coordinated Modeling Center (<http://ccmc.gsfc.nasa.gov/>). The opportunity to synthesize their understanding in written and oral reports and the ability to give and receive feedback will be part of the class.

Instructor:

Dr. Xianzhe Jia, Associate Professor

Email: xzjia@umich.edu

Lectures:

9:00 -10:30 am, Monday-Wednesday-Friday

Virtual Class (See instructions below)

Instructor Office Hours:

1:00 - 2:00 pm, Monday

Virtual format (See instructions below)

Reading Material:

Many journal articles: the class is mostly based on recent papers in peer-reviewed journals

"Understanding Space Weather and the Physics Behind It," by Delores J. Knipp

"Physics of the Space Environment," by Tamas I. Gombosi

Neither is required, *either* is recommended (or a different space physics textbook)

Grading Apportionment:

Modeling Project #1	20%	(basic model usage)
Modeling Project #2	30%	(model analysis project)
Paper Critique #1	15%	(brief reports)
Paper Critique #2	15%	(brief reports)
In-class participation	10%	(group discussions)
Peer grading	10%	(grading of others)

Reports: Written and Oral

There will be 4 projects for this class. All will consist of an oral presentation (to the class) and a written report. All will be done individually, of varying length and content requirements and proportions toward your final grade.

- **Two of them will be paper critiques**, where I will assign each student a journal article to read and assess. The first critique will be rather short and the second one will be longer.
- **The remaining two projects are for your numerical modeling investigations**. We will use the Community Coordinated Modeling Center, CCMC, located at NASA Goddard Space Flight Center. The first of these will involve conducting a simple parameter study with an "Instant Run" code on CCMC. The second will be using existing runs and output from a "run-on-request" code to conduct a numerical experiment and address a physics question. At any time in this class, you are free to use a different code of your own choosing. This is especially encouraged for those students engaged in numerical-oriented research projects.

In-Class Participation: Discussions and Peer-grading

There are two ways that your in-class participation will be included in your final course grade. The first is to take part in the journal article critiques that we will conduct during class time. The second is to grade your peers on their oral reports, with points awarded for good explanations of the presenter's strengths and offering constructive suggestions for improvement.

Information and policy regarding virtual classroom

- All lectures will be given on-line through a virtual meeting platform at the nominal times scheduled by the University, i.e., 9:00-10:30 am on Monday, Wednesday and Friday.
- Below is the information for the Zoom meeting set up for the regular class lectures. Please make sure that you have access to Zoom on your computer. In the case when Zoom is experiencing technical problems, we will switch to Google Meet or another virtual platform if necessary.

Topic: SPACE 477 Class (Space Weather Modeling)

Time: Jan 20, 2021 09:00 AM Eastern Time (US and Canada)

Every week on Mon, Wed, Fri, until Apr 21, 2021, 40 occurrence(s)

Join Zoom Meeting

<https://umich.zoom.us/j/99093848876>

Meeting ID: 990 9384 8876

Passcode: 367775

You can download and import the following iCalendar (.ics) files to your calendar system. Weekly:
https://umich.zoom.us/meeting/tJ0tfuqqgjMiHdlsAcWMd54B2Ecimdfot36/ics?icsToken=98tyKuChrlpEtCduB6BRox5Aor4b_zwiFxHgqd0jz7mNA1XN1fUZMdBO797Fted

- Office hours will be held virtually via Zoom on **Mondays 1-2pm**, and the meeting link is given below.

Topic: SPACE 477 Office Hours

Time: Jan 25, 2021 01:00 PM Eastern Time (US and Canada)

Every week on Mon, until Apr 19, 2021, 13 occurrence(s)

Join Zoom Meeting

<https://umich.zoom.us/j/96406647862>

Meeting ID: 964 0664 7862

Passcode: 395105

To accommodate the needs from students who will not be able to attend the virtual class synchronously, all the lecture slides will be uploaded to Canvas, and the online lectures will be recorded via Zoom and be shared with the whole class through Canvas after each lecture.

SPACE 477: Space Weather Modeling Course Conduct Statement

Prof. Xianzhe Jia (xzjia@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 Collaboration

There are no homework sets or exams for this course; your grade is based on written and oral reports and in-class participation. You are allowed and encouraged to discuss together anything assigned in the class. However, all submitted work (content of all reports and presentation files) is to be generated by you alone.

You are not allowed to possess, look at, use, or in any way derive advantage from the existence of submissions prepared in prior years, whether these documents were former students' work product or copies of submissions/solutions that had been made available by others.

Unless arrangements are made with me beforehand, late submissions will be accepted but marked down 10%, until the time when the graded assignments are returned to the students (about a week). At this point, submissions for that assignment will no longer be accepted (again, unless arrangements were made prior to the original submission deadline).

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.