

COLLAGE Course 2023

ASEN-5519-007,008: Space Weather Overview

Location and Time:

AERO N250 and Zoom:

Wed 1:00 - 2:15 PM MDT (Jan 18 – May 3)

Office hour: TBD

Course Coordinator:

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Course webpage:

<https://nso.edu/students/collage/collage-2023/>

1. Overview

This hybrid course is the 10th offering of the *George Ellery Hale Collaborative Graduate Education (COLLAGE)* program, a joint effort between CU Boulder, the National Solar Observatory (NSO), the New Jersey Institute of Technology (NJIT), the University of Hawai'i (UH), New Mexico State University (NMSU), Montana State University (MSU), and the High Altitude Observatory (HAO).

This semester's COLLAGE is a 2-credit seminar-based graduate course, with a focus on space weather. At CU, it is offered as ASEN-5519-007 and ASEN-5519-008 (remote), and we will also hold synchronous zoom sessions to join together everyone at all of the participating institutions and have interactions through Slack (<http://collage2023-asen5518.slack.com>).

Space weather refers to the dynamic conditions of the near-Earth environment and, in particular, its interaction with solar emissions and impacts on our technological infrastructure and society. Most of the space weather storms originated from solar eruptions, such as solar flares and coronal mass ejections, which can disturb the Earth's magnetosphere, ionosphere, and the upper atmosphere. These disturbances can cause problems with radio communications, satellite navigation (such as GPS), power grids, and in-orbit satellites. In this course, we will provide a series of seminars on selected topics about the space weather origin, impacts, observation, and forecast.

The goal of this course is to give an overview of the current studies on space weather, introduce the tools and data sources, and spark interest in space weather research.

2. Course Materials

There are no required textbooks for this class. Relevant reading materials will be distributed throughout the semester.

Optional reading materials that may be of interest to students include:

- Knipp, D. J., McQuade, M. K., & Kirkpatrick, D. (2011). Understanding space weather and the physics behind it. Learning Solutions.

- Daglis, I. A. (Ed.). (2001). Space storms and space weather hazards (Vol. 64). Springer Science & Business Media.
- Schrijver, K., Bagenal, F., Bastian, T., Beer, J., Bisi, M., Bogdan, T., ... & Zapp, N. (2019). Principles Of Heliophysics: a textbook on the universal processes behind planetary habitability. arXiv preprint arXiv:1910.14022.

3. Schedule of Topics

The seminar information listed here will be updated as the dates get closer.

1.	01/18	The structure and diagnostics of the solar atmosphere (Kevin Reardon)
2.	01/25	Solar irradiance variability (Serena Criscuoli)
3.	02/01	Solar wind (Xudong Sun)
4.	02/08	Solar eruptions (Xudong Sun)
5.	02/15	Solar activities predictions (Thomas Berger)
6.	02/22	The coupled space weather system (Shasha Zou)
7.	03/01	Geomagnetic storm and substorms (Shasha Zou)
8.	03/08	Atmospheric drag and impacts on LEO satellite trajectories
9.	03/15	Ionospheric effects on communication and satellite navigation (Yang Wang)
10.	03/22	Ionosphere observation from radio signals (Yang Wang)
	03/29	(Spring break at CU Boulder)
11.	04/05	Global electric and magnetic perturbations
12.	04/12	Space weather models
13.	04/19	Space weather observations and SWx TREC data portal (Thomas Berger)
14.	04/26	Nowcast and forecast of space weather
15.	05/03	Course summary, discussion, and voluntary student presentations.

4. Grading

This being a seminar covering a broad range of topics, we do not have mid-term or final exams, and students are encouraged to work on selected assignments based on their interest and get feedback from the speakers. The grades are based on attendance, class engagement, follow-up discussions regarding recommended assignments, and voluntary student presentations.

Grades are allocated as the following:

Seminar attendance and participation 70%

Follow-up discussions 30%
Student presentation +20%

5. University Policies

6.1 Classroom Behavior

Both students and faculty are responsible for maintaining an appropriate learning environment in all instructional settings, whether in person, remote or online. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy. For more information, see the policies on classroom behavior and the Student Conduct & Conflict Resolution policies.

6.2 Accommodation for Disabilities

If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to your faculty member in a timely manner so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities in the academic environment. Information on requesting accommodations is located on the Disability Services website. Contact Disability Services at 303-492-8671 or dsinfo@colorado.edu for further assistance. If you have a temporary medical condition, see Temporary Medical Conditions on the Disability Services website.

6.3 Preferred Student Names and Pronouns

CU Boulder recognizes that students' legal information doesn't always align with how they identify. Students may update their preferred names and pronouns via the student portal; those preferred names and pronouns are listed on instructors' class rosters. In the absence of such updates, the name that appears on the class roster is the student's legal name.

6.4 Honor Code

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the Honor Code academic integrity policy. Violations of the Honor Code may include, but are not limited to: plagiarism, cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty. All incidents of academic misconduct will be reported to the Honor Code (honor@colorado.edu; 303-492-5550). Students found responsible for violating the academic integrity policy will be subject to nonacademic sanctions from the Honor Code as well as academic sanctions from the faculty member. Additional information regarding the Honor Code academic integrity policy can be found on the Honor Code website.

6.5 Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation

CU Boulder is committed to fostering an inclusive and welcoming learning, working, and living environment. The university will not tolerate acts of sexual misconduct (harassment, exploitation, and assault), intimate partner violence (dating or domestic violence), stalking, or protected-class discrimination or harassment by or against members of our community. Individuals who believe they have been subject to misconduct or retaliatory actions for reporting a concern should contact the Office of Institutional Equity and Compliance (OIEC) at 303-492-2127 or email cureport@colorado.edu.

Information about university policies, [reporting options](#), and the support resources can be found on the [OIEC website](#).

Please know that faculty and graduate instructors have a responsibility to inform OIEC when they are made aware of incidents of sexual misconduct, dating and domestic violence, stalking, discrimination, harassment and/or related retaliation, to ensure that individuals impacted receive information about their rights, support resources, and reporting options. To learn more about reporting and support options for a variety of concerns, visit [Don't Ignore It](#).

6.6 Religious Holidays

Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, you must let the instructors know of any such conflicts within the first two weeks of the semester so that we can work with you to make reasonable arrangements. See the [campus policy regarding religious observances](#) for full details.