

SPACE WEATHER RESEARCH, EDUCATION AND DEVELOPMENT INITIATIVE (REDI)

Space Weather: Physics, Applications and Operations
Fall 2013

3.00 Credits

Prerequisites:

Recommended but not required prerequisite introductory-level University Physics. Prerequisite: permission of instructor.

Classroom:

The course will be taught at NASA Goddard Space Flight Center Building 21. The course will be broadcasted via Google Hangouts to participating educational institutions.

Instructors:

TBD.

Course description:

This undergraduate-level course is intended to provide students with necessary background for carrying out research in space physics leading to space weather applications and possible predictive operational space weather products. We will cover the central physical concepts associated with space weather and introduce state-of-the-art models used to simulate the dynamic behavior of solar, heliospheric and magnetospheric space plasma environments. The students will learn how to use state-of-the-art modeling capabilities to analyze space weather events. Unique features of the course include student participation in operational space weather forecasting activities in collaboration with scientists at NASA Goddard Space Flight Center (GSFC).

The course will feature a number of guest lecturers. The guest lecturers are leading scientists and engineers in their areas of expertise and their participation provides a unique opportunity for the students to get exposure to the state-of-the-art in the field. As another unique feature, successful completion of the course will certify students to serve as secondary space weather foresters at NASA GSFC Space Weather Research Center (SWRC). SWRC undergraduate student forecasters are compensated for their work.

Textbook:

Due to the unique nature of the course there is no single textbook available for this course. See “recommended texts” and “online resources” for a collection of helpful material.

Recommended additional texts:

- Koskinen, H., Physics of Space Storms: From the Solar Surface to the Earth, *Springer*, 419 p., 2011. (Available at Amazon and as an online textbook via SpringerLink.com, which can be accessed at NASA GSFC)
- Daglis, I.A. (editor), Space Storms and Space Weather Hazards, *Nato Science Series II*, Vol. 38, 2001.
- Song, P., H. J. Singer, and G. L. Siscoe (eds.), Space Weather, *AGU Geophysical Monograph Series*, Vol. 125, 2001.
- Kivelson, M. G., and Russell (eds.), C. T., Introduction to Space Physics, *Cambridge University Press*, 1995.
- Parks, G. K., Physics of Space Plasmas. An Introduction, *Westview Press*, 2004.
- Carlowicz, M.J., R.E. Lopez, Storms from the sun: the emerging science of space weather, *Joseph Henry Press*, 2002. (lighter read)
- Clark, S., The Sun Kings: The Unexpected Tragedy of Richard Carrington and the Tale of How Modern Astronomy Began, *Princeton University Press*, 2007. (lighter read)

Online resources:

- Integrated Space Weather Analysis System (iSWA): iswa.gsfc.nasa.gov.
- CUA Space Weather Academy: <http://www.youtube.com/user/CUASpaceWeather>.

Course requirements and evaluation:

Participation in course activities, such as data analysis (70%), Final project (30%).

Course schedule:

TBD.