

GRADUATE CERTIFICATE IN SPACE WEATHER AND ENVIRONMENT



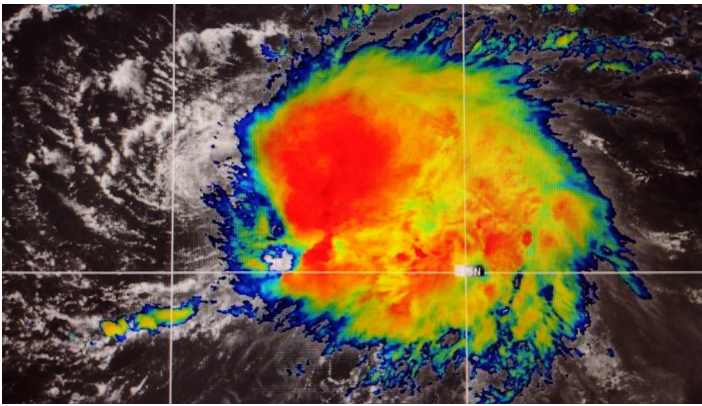
PROGRAM OVERVIEW

Space Weather and Environment: Science, Policy and Communication (SWEN) is a fully online, five-course, 15 credit-hour graduate certificate program for any professional whose career may be enhanced with a greater understanding in this subject area. This could include broadcast meteorologists and other TV and social media weathercasters, emergency responders, military personnel, federal and state policy advisors, legislative assistants, science journalists or anyone with an interest in space weather. Guided by the National Space Policy of the United States of America, this program is an avenue for professional development and advancement for those seeking to deepen and broaden their knowledge base and understanding of the Earth-Sun-Space environment as well as the impact space weather can have on infrastructure, communication and commerce. If you are responsible for communication and power grids, transportation and navigation systems, including space-based assets, commerce and other infrastructure, we encourage you to consider this certificate program. Additionally, this program will assist individuals in being better prepared to communicate these issues to policymakers, stakeholders and the public. The international scope of the SWEN certificate program will help prepare individuals for positions in the government, private, commercial and academic sectors. The program should be especially interesting for broadcast meteorologists who are seeking to gain knowledge and proficiency in space weather to better communicate to their market audience, especially when they are the only station scientist. The courses are taught by experts who are working in their respective areas of space weather.

WHAT WILL YOU LEARN

Those who have completed the SWEN certificate program will possess the ability to:

- Demonstrate basic knowledge of natural or environmental hazards, including space weather hazards and associated risks.
- Describe solar and space weather phenomena, including but not limited to aurora, coronal holes, coronal mass ejections (CME), solar flares, sunspots, solar cycle, geomagnetic storms, characteristics of the magnetosphere and behavior of the interaction between different elements.
- Relate terrestrial impacts of space weather phenomena to existing and emerging fields, including the variety of customers, operations and infrastructure most vulnerable (e.g., impacts on power grids, satellite performance, pipeline corrosion, airline operations, public awareness).
- Organize existing protocols and design new protocols for preparing and responding to space weather events.
- Describe and apply the products, data and graphics to communicate for specific space weather events.
- Develop new video products that will communicate space weather to specific audiences.



CURRICULUM

The following five courses (15-credit-hours) are required for completion of the graduate certificate in Space Weather and Environment: Science, Policy and Communication.

SWEN 571 The Origins of Space Weather (3 credits)

Phenomenological approach to understanding the origins of space weather and the space environment from the Sun to the Earth's surface, including a detailed treatment of coronal holes, coronal mass ejections, sunspots, solar flares, solar energetic particle events, solar radio bursts, solar structure (including its magnetic dynamo), solar wind, terrestrial magnetic field and geomagnetic storms.

SWEN 572 Impacts of Space Weather on the Technological World (3 credits)

Systems approach to understanding how space weather impacts the near-earth space environment, our magnetosphere, upper atmosphere and the myriad of ways it couples into the Earth system, detrimentally affecting space and ground-based technologies. Instruction will include the identification and impact of solar radio bursts, geomagnetic storms, geomagnetically induced currents (GICs), aurora and radiation storms on our technological infrastructure. This infrastructure includes satellite services and communications, GNSS/GPS global positioning and navigation, emergency services, radio communications, airline transportation, national electric utility services and power grids, as well as emerging industries such as unmanned aerial vehicle (UAV, aka drone) delivery systems, space tourism, asteroid mining, and robotic and human employment in hostile space weather environments. The course will go into the varying severity of impacts, from mild inconveniences to the possibility of a Carrington-class event that could cause a massive geomagnetic storm that could destroy national power grids worldwide and cause irreparable damage to the global economy.

SWEN 673 Effective Decision-Support for Space Weather Risks (3 credits)

Space weather data, products and information is a vital component for an effective decision-making process for relevant stakeholders. This course uses a case-studies approach to identify and document the most effective means of producing and delivering space weather information, including alerts, warnings and notifications to target audiences and the general public, and to ensure that space weather products are used intelligibly to inform decision-making. Prerequisites: SWEN 572.

SWEN 674 Space Weather Broadcast and Communications (3 credits)

Examines existing space weather data, images and products. These products will be important in learning how to create a space weather broadcast. Video projects pertaining to specific space weather events such as solar flares, geomagnetic storming, radiation storms, etc., will be important to demonstrate knowledge of which products to use for communicating a forecast. How to utilize resources – integrated space weather analysis system, solar dynamics observatory and others – will be stressed.

EMGT 614 Natural Hazards Primer (3 credits)

Natural science examination of natural or environmental hazards and their associated risks; the overview will include hazards such as hurricanes, tornadoes, earthquakes, tsunamis, floods and space weather.

CAREERS

Broadcast meteorologist • science communicator • science policy advisor
 • emergency responder • earth and space science teacher
 • airline meteorologist/forecaster • commercial space services
 • military contractor • station scientist • social media personality
 • legislative assistant • space weather enthusiast • shortwave radio operator
 • electrical power grid supervisor • oil and natural gas pipeline supervisor • anyone with an interest in space weather



This 15-credit graduate certificate will deepen and broaden one's knowledge base and understanding of the Earth-Sun-Space environment as well as the impact space weather can have on infrastructure, communication and commerce.

CONTACT

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