Continuing Education Units (CEUs) for Global Learning and Observations to Benefit the Environment (GLOBE) World Wide Program

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Abstract

The Global Learning and Observations to Benefit the Environment (GLOBE) world-wide program brings together 112 international universities along with their students, teachers, scientist and citizens to promote science and learning about the environment [1]. Elizabeth City State University was selected, by the National Aeronautics and Space Administration's GLOBE program, as a training site in 2018 [2]. Northeastern North Carolina and Southeastern Virginia, primary and secondary schools benefit directly from training opportunities and can receive CEU credits. This paper documents the ECSU GLOBE training center efforts to make these certificates available worldwide.

The collaborative partners are NASA's GLOBE Office within Langley Research Center's Science Directorate and The North Carolina Space Grant Office. They share a vision for a worldwide community of students, teachers, scientist and citizens working together to better understand, sustain, and improve Earth's environment at local, regional and global scales.

Protocol eTraining

Primary training vehicle for the CEU program is the use of the GLOBE eTraining online resources. Participants must create a login on that site to access the training resources including modules. For each of the modules, participants learn how to report data to the GLOBE website and visualize data using GLOBE's Visualization System [3]. Descriptions of the Hydrology and Atmosphere modules are given in the tables below.

Hydrology Modules	Step by step instructions	Participants Learning Outcomes
Introduction to Hydrosphere	For documenting a hydrosphere study site	Importance of documenting and monitoring the hydrosphere.
Mosquito Larvae	For collecting, sorting, identifying and counting the number of mosquito larvae, and determining whether your specimens represent taxa that potentially transmit disease	How to support community health initiatives by eradicating breeding sites in containers in your community.

Water Temperature	For the Water Temperature Protocol, using an alcohol-filled thermometer.	The procedure for measuring water temperature using an alcohol-filled thermometer.
Water Transparency	For the Water Transparency Protocol, using a piece of scientific equipment known as a transparency tube	The procedure for measuring water transparency using a transparency tube.
Electrical Conductivity	Introduction of the Electrical Conductivity Protocol	The procedure for collecting electrical conductivity measurements using a meter probe.
Water pH	For the water pH Protocol, using pH paper	To define water pH and explain how changing environmental conditions will result in different measurements.
Alkalinity	Introduction of the Alkalinity Protocol	To define water alkalinity and explain how environmental conditions affect the alkalinity of a water body.
Dissolved Oxygen	Introduction of the Dissolved Oxygen Protocol	The procedure for collecting dissolved oxygen measurements using a commercial kit.
Salinity	Introduction of the Salinity Protocol, using the titration method	To define water salinity and explain how changing environmental conditions will result in different measurements.
Nitrates	Introduction of the Nitrate Protocol using a commercial kit.	To define water nitrates and explain how changing environmental conditions will result in different measurements.

Similar Atmosphere protocols exist for Atmosphere. Like other GLOBE lessons, The GLOBE Atmosphere Investigation is available in English and the six United Nations languages: Arabic, Chinese, French, Portuguese, Russian, and Spanish.

Atmosphere Modules	Step by step instructions	Participants Learning Outcomes
Air Temperature	For observing maximum, minimum and current air temperature as part of a GLOBE Atmosphere Site. For placement of the weather shelter and when to take air temperature observations.	To learn different ways NASA observes air temperature and how it is used to study weather and climate.
Aerosols	For measuring aerosol optical thickness (AOT) using one of two instrument options	To use a GLOBE Sun Photometer or Calitoo.
Barometric Pressure	For taking barometric pressure observations as part of a GLOBE Atmosphere Site. For using an aneroid barometer and what the difference is between a barometer and an altimeter.	To understand how local observations can help NASA and are used to map the weather.

Clouds	For selecting and defining a GLOBE atmosphere Clouds protocol study site	To explain what clouds are and how they form; explain why clouds are an important element of the Earth system; explain why cloud observations are important for understanding our changing Earth system; identify a Clouds study site and take observations of the sky
Precipitation	For observing rainfall using a GLOBE approved rain gauge as part of a GLOBE Atmosphere Site	To understand how to read a rain gauge properly, when to take the observation
Relative Humidity	For using a digital hydrometer or a sling psychrometer properly and be able to relate relative humidity to air temperature.	To take relative humidity observations and why it is an important observation to take.
PRECIPITATION - Snow	For observing new snowfall and snowpack as part of a GLOBE Atmosphere Site. For measuring snow water equivalent and the pH of snow.	To understand how NASA observes snow cover using satellites.
Surface Temperature	For surface temperature observations as part of a GLOBE Atmosphere Site using an infrared thermometer.	To understand why surface temperature observations are important to NASA.

The ECSU site is now making it possible to achieve state or locality Standard teacher's license requirements. Standard teacher's license does not require renewal and a Standard license does not expire as long as professional development requirements are met. 6 semester hours or 6 DOE service credits or 180 continuing education hours or combination of above.

Each semester the ECSU site offers a GLOBE CEU Challenge. Participants must complete Hydrosphere or Atmosphere modules and assessments. CEUs are awarded upon completion. Participants register through Jeff Wood, secretary for the GRSS chapter #03191 who serves as administrative point of contact for the CEU program. "The GLOBE Program will offer Continuing Education Credits (CEUs) Certificates to teachers based on enrollment and contact hours" says Garry Harris, GLOBE Southeast Regional Director.

Shown left is Dr. Lin Chambers, NASA Science Education Integration Manager, with five (5) GLOBE teachers. Shown right is a group photo of participants with Jessica Taylor, GLOBE Master Trainer in Atmosphere.

REFERENCES

[1] NASA GLOBE websites https://www.globe.gov/get-trained/protocol-etraining/etraining-modules2

[2] ECSU globe teacher training website http://nia.ecsu.edu/globe/events/190405globe/

[3] A Summary Document about GLOBE eTraining. https://www.globe.gov/get-trained/protocol-etraining/etraining-modules/16867649/12273