Virginia Earth System Science Scholars (VESSS)

Program Fact Sheet

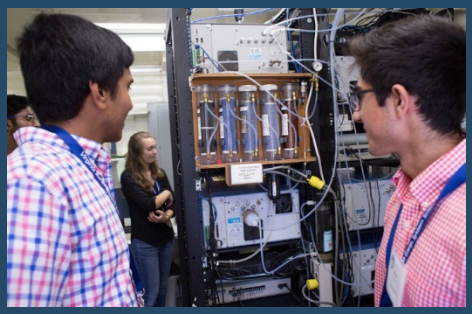
The Virginia Earth System Science Scholars (VESSS) program, **vsgc.odu.edu/VESSS** offers Virginia high school juniors and seniors statewide a five-college credit program consisting of an interactive, semester-long on-line course followed by a summer academy experience at NASA Langley. The Virginia Space Grant Consortium manages the program and partners with NASA Langley Research Center and the Hampton University Center for Atmospheric Research and Education in its implementation. Keeping this course free allows all students in the Commonwealth, regardless of economic status, the opportunity for this STEM experience. VESSS undergoes internal evaluation and academy participants are longitudinally tracked to their next academic or employment step. Since VESSS conception 52% pursuing engineering degrees, 36% science degrees with 12% currently undecided.

The VESSS program cultivates students for entry into the 21st-century STEM workforce through the development of skills such as critical thinking, technical writing, data analysis, and inquiry-based problem solving as well as learning soft skills such as communication, collaboration, and adaptability. VESSS also provides a foundation in preparing students for entry into the STEM pipeline by introducing students to the Earth Sciences and Geoscience concepts that are not adequately covered by the traditional classroom curriculum. The VESSS program has been in existence for the past two years and has shown growth in females and minorities.

THE COURSE: The online course, which runs December through May, provides real-world investigations of the Earth's systems through the use of NASA and NOAA research and data. The course offers four transferable college credits in Geology 105 through Virginia Peninsula Community College (VPCC), which is underwritten by Virginia Space Grant Consortium.

Scholars engaged with NASA HQ mentor, Dr. Elaine Seasly, in the uses of polyimide

Dr. William Moore, Professor, Hampton University Center for Atmospheric Research and Education discussing the importance of Earth System Science research.



Scholars touring the CAPABLE facility at NASA Langley Research Center.

Dr. Jeffrey Jordan, addresses Scholars on Mission Design.

The course consists of seven modules and a capstone final project which incorporates the knowledge learned in the modules. The modules are based on current NASA Earth Science Directorate missions as well as future science missions posed by the National Research Council. Each module consists of an APA research paper based on the prompt provided, a lab component using current NASA and NOAA data, a quiz, and usually a fourth assignment which varies based on the unit topic. Module topics include: An Introduction to Earth System Science, Earth in the Solar System, Earth's Interior, Atmospheric Composition, Weather, Water, and the Energy Cycle, Climate Variability, and The Carbon Cycle and Ecosystems.

SUMMER ACADEMY: Upon successful completion of the on-line course, high performing students are invited to a seven-day, residential summer academy at NASA Langley Research Center in Hampton, Virginia. Students selected to participate in the Summer Academy are immersed in the design of a hypothetical mission to study one of the Earth's major spheres and how the spheres are interconnected. The Academy divides the students into four teams each addressing a real-world scenario relating to one of the four major spheres: Atmosphere, Biosphere, Hydrosphere, and Lithosphere, with each concentrating on a real-world scenario currently being studied or that will be studied by NASA. Scholars work under the mentorship of NASA Langley Research Center and other scientists, engineers, and technologists to examine state of the art knowledge on issues such as precipitation in clouds, climate zone changes, sea level changes and analyzing ground subsidence of volcanic activity. At the culmination of the Summer Academy, students present their mission design concepts to a panel of NASA and industry experts. Students can earn an additional free dual-enrollment college credit in Geology 199: Supervised Studies in Geology from VPCC.

One of the most important aspects of the Summer Academy experience is the opportunity for students to meet and work with NASA, collegiate, and industry mentors. As the mentors share their experiences of "how I got where I am today" stories, students learn that many of them faced challenges, but never lost sight of their goals. VSGC has offered fourteen summer academy sessions. Which has shown a study growth in participation of females and minorities. One Scholar's statement echoes the thoughts of many Scholars, "This academy helped me get out of my comfort zone and meet others who have challenged me more than I have ever been challenged. I met the most amazing scientists/ engineers from NASA who have inspired me to pursue a career in Geosciences there. Their positive attitudes and passion for their jobs has enlightened me and made me realize work doesn't have to feel like work if you enjoy what you do."

Sponsors will be recognized in all program promotional materials, be invited to interact with Scholars, and included in the summer academy closing ceremonies.

Contact:
VSGC Director Mary Sandy msandy@odu.edu
757/766-5210

***Statewide Engagement*: The program began in 2015 and continues to date.**

Table 1 indicates the number of students who participated in the online course and the breakdown of gender, underrepresented minorities, and career and technical education-track students.

Table 1: Online Course Participant Totals and Demographic Information.

	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	Cumulative Totals
Total Participants	132	117	180	177	232	200	151	**1189**
Males (%)	46%	45%	44%	41%	42%	42%	45%	**44%**
Females (%)	54%	55%	56%	59%	58%	58%	55%	**56%**
Underrepresented Minorities (%) *	22%	30%	24%	17%	22%	18%	17%	**22%**
Career and Technical Education-track Students (%)	33%	40%	45%	35%	33%	35%	40%	**37%**
Virginia Senate Districts Represented (%)	95%	90%	87.5%	100%	95%	90%	85%	**100% Districts Represented**
Virginia House Districts Represented (%)	78%	64%	68%	72%	78%	67%	63%	**100% Districts Represented**

* Self-reported: Up to 12% of students have indicated “other”

Student Distribution Map