



THE STEM ACCELERATOR PROGRAM

Padmanabhan Seshaiyer, Professor and Director
Faculty Members: Claudette Davis, Mary Ewell, Kelly Knight
Mary Nelson, Julia Nord, Katherine Pettigrew, James Schwebach
College of Science, George Mason University, Fairfax, VA 22030
Website: <http://stem.cos.gmu.edu>



THE STEM ACCELERATOR

The STEM Accelerator program was created by the College of Science (COS) at George Mason University (GMU) in 2011 with a focus on the success of students in STEM at all levels. In particular the program is tasked with four major goals of increasing the number of STEM majors, improving retention rates of STEM students, reducing their time to graduation, helping them join the STEM workforce or continue their education upon completion of their Bachelor's degree in STEM disciplines. Created as an interdisciplinary unit, this division consists of faculty members from multiple departments who have special responsibilities besides teaching that includes coordinating and promoting STEM activities that help achieve the four primary goals. Currently, the program includes faculty from Mathematical Sciences, Chemistry, Biology, Physics, Astronomy, Computational Sciences, Forensic Sciences, Atmospheric Ocean and Earth Sciences.

The STEM Accelerator program runs initiatives at all levels including STEM Mania (summer camp for grades 3-5 students), Regional STEM fair (a K-8 Science and Engineering Fair for elementary and middle school students), FOCUS (Females of Color Underrepresented in STEM summer camp for middle school girls), High School Mentored Research (through partnership with school districts in Northern Virginia), STEM Boot camp (a pre-interventional program for incoming freshmen to get them ready for four-years of college in STEM), Undergraduate Learning Assistants Program (that offers peer-to-peer mentoring opportunities both within the university as well as partnering community colleges), Research Experience for undergraduate and graduate students (through mentorship and experiential learning), Discipline Based Education Research (a platform for sharing best teaching practices between faculty), STEM Teacher Professional Development (PD) Programs (for engaging teachers in effective pedagogical practices through problem solving and lesson study) and many more.

As Aristotle once said, "The whole is greater than the sum of its parts." The STEM Accelerator program truly epitomizes this statement with the STEM faculty constantly trying to work together to create new initiatives that will help provide opportunities for excellence, cast a wide net and foster a supportive ecosystem to develop the next generation of STEM innovators. This does not just mean preparing the students at all levels on content in STEM in VA but also includes preparing them to become better collaborators, communicators, critical thinkers and creative problem solvers, the four fundamental pillars of twenty-first century skills!

STEM Accelerator Program: Best Places for STEM Graduates

George Mason University's STEM Accelerator program ranked in the Top Ten Metro Areas for STEM Graduates dedicated to attracting and graduating more STEM majors in addition to helping them find employment in the STEM fields. To read more, go to: <http://www.nerdwallet.com/blog/nerdscholar/2013/best-places-for/>



STEM Accelerator Program
College of Science

COLLEGE OF SCIENCE
STEM ACCELERATOR

<p>Our Mission Increase the number of STEM majors Improve retention of STEM students Reduce students time to graduation Build capacity in the STEM workforce</p>	<p>STEM CURRICULUM DEVELOPMENT High School Dual Enrollment Professional Masters in Science Governor School @ Innovation Park STEM & STEM-H Programs</p>
<p>STEM RETENTION The Learning Assistants Program STEM Boot camps Oral Reviews/Peer-Peer Mentoring</p>	<p>STEM TEACHER PROGRAMS NOYCE Teacher Scholarships STEM Professional Development STEM K-12 Math Science Partnerships STEM High school of the Future</p>
<p>STEM RECRUITMENT COS Visits for High School Students High School Mentorship Program STEM Education Clubs</p>	<p>STEM K-12 OUTREACH STEM Afterschool Programs STEM Middle School Academics STEM Science and Engineering Fair STEM Elementary Summer Camps</p>
<p>STEM FACULTY DEVELOPMENT Discipline Based Education Research Undergraduate Research Experiences Faculty Research Grants Development</p>	<p>STEM GLOBAL Department of State Global Initiatives Organization of American States Teacher to Teachers International</p>
<p>STEM JOBS WORKFORCE STEM Internships & Fellowships STEM Workforce Council</p>	<p>Contact: Padhu Seshaiyer Email: pseshaiy@gmu.edu</p>

LEARNING ASSISTANT PROGRAM



One of the hallmarks of the program to support the retention and reducing the time to graduate in the college is the Learning Assistant (LA) Program. This peer-to-peer program gives undergraduate STEM students the opportunity each semester to engage in face-to-face and online collaborations to help reinforce content taught in the classroom. The LA program has three main goals: (a) Facilitate the learning of undergraduates in classrooms, labs, help rooms, and other venues through the use of LA's who understand the material and attend the course lectures; (b) Deepen the LA's understanding of important concepts of the course in which they are working by having them assist the learning of other undergraduates and; (c) Expose LAs to the process of teaching and learning through weekly workshops and hands-on teaching experience. The LAs meet each week to receive pedagogical training from the STEM Accelerator faculty on how to best help the students learn. All LAs are also invited to present a poster that showcases their work as an LA and their experiences. One student shared "By helping the students understand the material, I was able to test my own knowledge and better understand the material as well." Another student shared that, "Being a LA has also helped to reinforce my own knowledge in preparation for graduate school and to build confidence in my ability to teach at the college level in the future." In three years the program has tripled in size and supports over 75 LAs each semester who assist faculty in various undergraduate courses.

ORAL REVIEWS

Oral reviews are optional, ungraded small group sessions of 5-6 students who work at white boards. A facilitator asks conceptual questions and students explain their thinking verbally or through graphical representations. This approach has been shown to improve student performance in "gateway" math courses. The average exam score of students who participated in oral reviews was more than about 15% on an average than those who did not participate. Since this has been successful, currently this strategy is extended to other STEM "gateway" classes.



STEM BOOT CAMP

STEM Boot camp is a one-week pre-interventional program to expose incoming freshmen to content in gatekeeper classes such as Calculus I, General Chemistry, Cell Biology, Introduction to Physics along with hands-on labs, study skills and college readiness activities. All students also participate in important college life skills (how to study, how to take an exam, time management and learning styles). Results from our first cohort of students show 83% of those who declared a STEM major are currently in their major.



RESEARCH PROGRAMS

CUR Posters on the Hill: Being selected to represent Virginia for this premier undergraduate research event gave an opportunity to meet and discuss the importance of STEM with Virginia Senators and Congressmen. The work was also commended by both the former and current Virginia Governors. Member of the Congress Robert J. Wittman from 1st District Virginia quotes, "Dear Professor Seshaiyer, Your creative and very practical work offers such valuable insight into our society. As our Nation and Northern Virginia grows in diversity, it is essential that we, especially lawmakers, understand the social interaction between groups in our communities. I also want to commend you for your continued contributions to the fields of science and mathematics at George Mason University. Given the growing importance of Science, Technology, Engineering and Mathematics (STEM) in our economy and our society, it is encouraging to know we have such compassionate teachers challenging and supporting the next generation of thinkers and innovators."



MENTORSHIP INSTITUTE

In Summer 2014, Academic Year Governor's Schools (AYGS) high school teachers participated in a mentorship institute coordinated through the STEM Accelerator Program where they were exposed to interdisciplinary themes including biodiversity, conservation biology, mathematical modeling, statistics and applications to real-world problems. For all topics, the participants were trained to become good at collecting, organizing and analyzing data for real-world problems through descriptive and inferential data analysis. Follow-up webinar sessions were held in Fall 2014 and provided the participants with continuing support in implementing mentorship, materials and strategies to share interdisciplinary research ideas and analyze student learning.



OUTREACH PROGRAMS

Fairfax County Regional Elementary - Middle School Science and Engineering FAIR

Saturday, April 5 at George Mason University

Project: In No V A S I O N

FAIR

DIVISIONS
Division I: Grades 1-3
Division II: Grades 4-6
Division III: Grades 7-8

F.O.C.U.S.
A GMU College of Science Summer Camp for Females of Color Underrepresented in STEM

July 21-25, 2014
Camp: \$250 (5-10:00 pm)
Meal: \$100 (10:00-11:00 pm)
Apply your student ID for the computer lab (science, color diversity, animation, and more!)

April 21, 2014
STEM Accelerator Program
College of Science
George Mason University
1101 S. FARMER ST. ARLINGTON, VA 22202
STEM Accelerator Program
Phone: 703-991-6977

F.O.C.U.S.
A GMU College of Science Summer Camp for Females of Color Underrepresented in STEM

July 21-25, 2014
Camp: \$250 (5-10:00 pm)
Meal: \$100 (10:00-11:00 pm)
Apply your student ID for the computer lab (science, color diversity, animation, and more!)

April 21, 2014
STEM Accelerator Program
College of Science
George Mason University
1101 S. FARMER ST. ARLINGTON, VA 22202
STEM Accelerator Program
Phone: 703-991-6977

GLOBAL STEM PROGRAMS

Building STEM Capacity in Africa

Engaging Students in Africa in STEM

Engaging Students in Myanmar in STEM

Engaging Students in South Korea in STEM

Acknowledgements: The STEM Accelerator Program thanks the GMU College of Science, the 4-VA Consortium, the GMU Office of Student Scholarship, Creative Activities, and Research (OSCAR), the Business Women's Giving Circle, the Virginia Department of Education and the National Science Foundation for supporting our various STEM initiatives.

