



Scholarships Advancing STEM Students

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Dr. James Maccariella is a Professor of Engineering at Mercer County Community College, where he serves as the Coordinator of the Engineering Science and Civil Engineering Technology programs, as well as the Chair of the Engineering and Technology Department. He is a graduate of Drexel University, where he earned a B.S. in Architectural Engineering, a B.S. in Civil Engineering, and a M.S. in Civil Engineering. In addition, he earned his Ph.D. from Old Dominion University. He is a Licensed Professional Engineer in NJ, NY, and PA with over 25 years of design experience. He is the PI of the NSF S-STEM program "Scholarships Advancing Mercer STEM Students (SAMS)" and well as the PI for two Innovation Grants: "Transforming Engineering Access for Mercer Students (TEAMS)," and "Engineering TLC-Tutors and Learning Communities."

Prof. Laura Blinderman, Mercer County Community College

Laura Blinderman is a Professor of Biology at Mercer County Community College. She received her MS degree in from San Diego State University where she studied molecular evolution. She has served as Science department Chair since 2016 and is a co-PI on a Robert Noyce grant to increase STEM educators in middle and high schools.

Prof. Helen Tanzini, Mercer County Community College

Helen Tanzini is a Professor of Chemistry at Mercer County Community College, where she has been teaching Organic Chemistry for 20 years and serves as the Coordinator of the Chemistry program. She is a graduate of Rutgers University, where she earned a B.S. and M.S. in Chemistry. She is a Co-PI of the NSF S-STEM program "Scholarships Advancing Mercer STEM Students (SAMS)". She was a Co-Pi on the NMR Collaborative Training Partnership (NSF Grant # 9952369) and the PI on the Keeping Science At The Forefront, PSE&G Neighborhood Partner Funding Program. She is very active in the American Chemical Society (ACS) and coordinates the Trenton section of the ACS outreach programs.

Prof. Richard Porter, Mercer County Community College

A graduate of Rutgers University in Mathematics and Chemistry. Worked in pharmaceutical industry as a computer programmer for several years. Teaching predominantly calculus and foundations mathematics since 1994. Enjoy current technology and "real life" applications of mathematics. Involved in several academic clubs, organizations, societies, and Mercer's Honors Program. Currently a caregiver, avid gardener, and horticultural volunteer.

Scholarships Advancing Mercer STEM Students (SAMS)

Background

Mercer County Community College (MCCC) is a comprehensive, publicly supported open-admission two-year institution. MCCC has two campuses located in central New Jersey and an enrollment of approximately 13,000 students. Mercer students represent a variety of ages and cultures, adding to the diversity and richness of their college experience. The geographic area surrounding MCCC is struggling, with the majority of high school students that feed into MCCC living in low-income families and receiving free or reduced lunch. The under-represented minority (URM) and female populations at MCCC are quite high, which creates a perfect opportunity to support and encourage these students in the fields of Science, Technology, Engineering and Math (STEM), where their populations are traditionally not as high.

Low-income students consistently perform less well in college, have lower academic aspirations, and are less likely to progress in math and science courses than students who come from families with higher incomes [1]. The level of high school mathematics required to be successful in college are courses above Algebra 2 [2]. However, students with a low socioeconomic status typically attend high schools that are much less likely to offer mathematics courses above Algebra 2 [2]. Thus, students with a low socioeconomic status are less likely to be ready to succeed in college. College programs that intend to only admit the most talented and well prepared students, may be inadvertently limiting diversity by not admitting students with a low socioeconomic status [3]. The Scholarships Advancing Mercer STEM Students (SAMS) program seeks to attract local, highly motivated, needy students that demonstrate an aptitude for STEM careers, while focusing on under-represented minorities in STEM disciplines.

Goals

The SAMS program provides up to 120 scholarships for academically talented full-time STEM students who have a demonstrated financial need. The program allows students to successfully graduate and/or transfer to 4-year institutions in STEM fields. The program has a five-year duration, and is now completing its third year. The objectives of the program are to: 1) retain at least 75% of the scholars for the duration of the grant; 2) have 50% of the scholars be

underrepresented minorities (URMs) or women in STEM disciplines; 3) have the scholars be enrolled full-time and participate in intervention and advising programs as a cohort; and 4) have 75% of the scholars successfully graduate or transfer in the field of STEM.

Selection

Recruitment of SAMS scholars is achieved by visiting area high schools, hosting evening information sessions, and presenting at regional and national STEM conferences. The SAMS application includes the student's essay, transcripts, letter of recommendation, FAFSA form, and standardized test results (SAT, ACT, Accuplacer). While all students are encouraged to apply, the SAMS program focuses on low-income minority students and veterans.

Activities

The major activities of the program include attendance at meetings/conferences, seminars, community building, career counseling, and mentoring. In addition, recruitment and retention activities include a high school summer bridge program, weekly cohort meetings focusing on college success and transfer strategies, and peer-tutoring. The project is designed as a selective program for a cohort of students featuring nationally recognized strategies to promote STEM success.

The SAMS program includes weekly meetings and study groups (with pizza) to help students bond in a non-formal, non-threatening environment; which is in contrast to the high-stress environments experienced in math and science classes. Students attend conferences to view presentations by industry professionals. Field trips provide opportunities to observe construction projects and learn design methods used in current practice. The field trips also provide further opportunities for student bonding. Lastly, guest speakers provide students with networking and internship opportunities. The guest speakers discuss a wide range of topics that are designed to be helpful for STEM students, such as working as a team, preparing resumes, networking, and financial planning.

Results

Program results to date have met the desired objectives. Year 1 resulted in 90% retention, 71% URM or women, 90% participation in intervention and advising, and 87% graduation/transfer. Student feedback for year 1 found favorable results for engagement and motivation, and access to study groups. While most students also reported favorable perceptions of student relationships, confidence, and access to mentors, approximately eight percent reported unfavorable perceptions in these areas for year 1.

Year 2 resulted in 95% retention, 50% URM or women, 90% participation in interventions and advising, and 75% graduation/transfer. Student feedback for year 2 found favorable results for student relationships, engagement and motivation, access to study groups, and confidence. In addition, most students reported favorable perceptions of access to mentors, while eight percent reported unfavorable perceptions in this area. It is noted that student perceptions improved from year 1 to year 2, particularly in the student relationships, and confidence perceptions. Thus, the program's formative assessments seem to be working.

Closing

The SAMS program seeks to build a supportive environment and provide guidance and encouragement throughout a student's program of study. The authors believe students must be engaged and motivated to allow for successful student development. However, opportunities for student engagement and development at the community college are often limited, particularly for students with family, employment, and other life pressures. Thus, the SAMS program provides a mechanism for guidance and encouragement that has resulted in improved student engagement and confidence. In fact, the success of the SAMS program has led to the creation of an industry collaboration entitled the DaVinci Learning Community. The DaVinci program seeks to expand upon the SAMS program activities. The DaVinci program provides an introduction to STEM professions, strengthens teamwork opportunities, improves career preparation, and prepares students for internships. The DaVinci program is funded by DaVinci Affiliates, who are industry professionals that generously support the program activities.

The project team looks forward to building on both the SAMS and DaVinci programs, and seeks to engage and motivate talented students to graduate or transfer in STEM fields.

References

- [1] V. Lundy-Wagner, C. Veenstra, M. Orr, N. Ramirez, M. Ohland and R. Long, "Gaining Access or Losing Ground?: Socioeconomically Disadvantaged Students in Undergraduate Engineering, 1994–2003", *The Journal of Higher Education*, vol. 85, no. 3, pp. 339-369, 2014.
- [2] C. Adelman, *The Toolbox Revisited: Pathways to Degree Completion from High School through College*. Washington, DC: U.S. Department of Education, 2006.
- [3] G. Kuh, J. Kinzie, J. Schuh and E. Whitt, *Student Success in College: Creating Conditions that Matter*. San Francisco, CA: Jossey-Bass, 2005.