

## **An S-STEM Scholarship Program Engaging Transfer Students in the Materials Intensive Engineering Departments: Successes And Unexpected Challenges**

**Prof. Dwayne D Arola, University of Washington**

Dr. Arola is an Associate Professor in the Department of Materials Science and Engineering at the University of Washington. He has been committed to improving engineering education for over 20 years and is primarily focused on improving the success of transfer students.

**Sandra B Maddox, University of Washington**

**Dr. Cara Margherio, University of Washington**

Cara Margherio is the Assistant Director of the UW Center for Evaluation & Research for STEM Equity (CERSE). Her research spans the study of intersectionality, higher education, organizational change, and social movements. Cara uses mixed methods to understand the social mechanisms which may change, or facilitate, the production of inequities within higher education. Cara also manages the evaluation of several NSF- and NIH-funded projects, primarily working with national professional development programs for early-career academics from groups systemically marginalized in STEM fields.

**Prof. Lilo Pozzo, University of Washington**

**Dr. Eleftheria Roumeli, University of Washington**

Eleftheria Roumeli joined the Materials Science & Engineering department at the University of Washington in January 2020 as an Assistant Professor. Previously, she was a postdoctoral scholar at California Institute of Technology and ETH Zurich, working on a new class of biocomposite materials from plant cells, as well as architected nanocomposite materials. She received her B.S. (2009) and Ph.D. in Physics (2014) from the Aristotle University of Thessaloniki in Greece. In her Ph.D. research, she focused on identifying structure-property relationships in synthetic polymer nanocomposite materials.

**Dr. Ismael Fajardo, City of Seattle, Department of Education and Early Learning**

**An S-STEM Scholarship Program Engaging Transfer Students in the Materials Intensive  
Engineering Departments: Successes Among Unexpected Challenges**

<https://monolith.asee.org/public/conferences/309/papers/35762>

Dwayne Arola<sup>1,2</sup>, Sandra Maddox<sup>1</sup>, Eleftheria Roumeli<sup>1</sup>, Lilo Pozzo<sup>1,3</sup>, Junlan Wang<sup>1,2</sup>, Ismael Fajardo<sup>4</sup>

<sup>1</sup>Department of Materials Science and Engineering, University of Washington, Seattle, WA,

<sup>2</sup>Department of Mechanical Engineering, University of Washington, Seattle, WA

<sup>3</sup>Department of Chemical Engineering, University of Washington, Seattle, WA USA

<sup>4</sup>Department of Education, City of Seattle, Seattle, WA USA

Abstract: 485 < 500 words

Submitted to: 2022 ASEE Zone IV Conference

The authors have no conflict to declare.

---

<sup>^</sup>Corresponding Author  
Dwayne Arola, Ph.D.  
Department of Materials Science and Engineering,  
University of Washington  
Roberts Hall, ROB 333  
Box 352600  
Seattle, WA 98195-2120  
[darola@uw.edu](mailto:darola@uw.edu)  
+1 (206) 543-5349 (v)  
+1 (206) 685-8047 (f)

## **An S-STEM Scholarship Program Engaging Transfer Students in the Materials Intensive Engineering Departments: Successes Among Unexpected Challenges**

**Abstract reviewed presentation only**

**Abstract** – Through support of an S-STEM grant from the National Science Foundation, we have developed a scholarship program that is focused on students transferring from community colleges to our institution with interest in pursuing degrees in the “materials-intensive” engineering departments, i.e., Chemical Engineering, Materials Science and Engineering and Mechanical Engineering. The program builds on collaboration between the three departments and five regional partner colleges, including Edmonds College, Everett Community College, Green River College, Seattle Central College and Whatcom Community College. The overall objectives of this S-STEM program are to: i) increase the number of academically talented students from diverse backgrounds in the "materials-intensive" engineering departments at our institution, ii) increase the number of transfer students from regional community colleges in the materials-intensive departments, and iii) identify the contributions of educational experiences and unique matriculation pathways that cause disparities in the number of applicants to the three materials-intensive departments.

In addition to scholarships, the Scholars (i.e., scholarship recipients) are provided with additional opportunities that are aimed at increasing their wholistic development as materials engineers and potential for securing successful careers. Specifically, the Scholars are provided access to faculty mentoring, career development workshops, engagement with industry professionals to establish mentors, introduction to recruiters to understand how best to secure internship opportunities, as well as complementary activities. Through these opportunities the Scholars develop professional skills that are seldom attainable in a conventional engineering curriculum. In its third year, the program has provided scholarships to 44 undergraduate students and 5 graduate students and achieved a high level of diversity relative to non-Scholar control (45% of participants belong to an underrepresented minority group). Despite hardships related to the pandemic, the program has had 100% retention of the Scholars. Furthermore, both the

undergraduates and graduate students met or exceeded the performance of the general student population in their respective engineering departments as indicated by GPA.

Exit surveys have been administered annually for the Scholars to rate the perceived contribution of program activities towards their total development and potential for success. Of all activities the Scholars rated their experiences with faculty mentors and seminars with previous graduates that entered graduate school and industry as the highest. These activities are very cost-effective and are being considered for universal implementation to the undergraduate programs. However, the surveys also revealed some weaknesses of the program. While students rated faculty mentorship very highly, they felt under-prepared to identify and approach faculty mentors to establish a relationship. The Scholars also felt some difficulty to connect and build community with their peers. Not surprisingly, that was exacerbated by the transition to a virtual teaching format. Most surprising, however, is that the students' sense of belonging in engineering did not improve from their introduction to the program. Those challenges were unexpected and have established the need for introducing new activities in the program, including peer mentoring and community-building exercises to elevate their sense of belonging and level of success.