Dr. Arpita Saha is an Associate Professor in the Department of Chemistry & Biochemistry at Georgia Southern University (GSU). She conducts research in Bioinorganic Chemistry, Magnetic Materials, and Environmental Chemistry and teaches courses for freshmen to graduate students. She serves on the leadership committee for the College of Science and Mathematics' Diversity & Inclusion Collaborative, Alliance of Women in STEM, developing Freshmen Research Program at GSU. She organizes workshops on Inclusive Teaching Practices in the classroom and empowering underserved groups in STEM. She engages students in scholarly research pursuits via classroom teaching. Dr. Saha is the recipient of 2021 USG Hall of Fame Faculty Award.

Dr. Leah Williams has a doctorate in Chemistry Education with ten years of experience conducting STEM education research. Her research interests include student resource use, open-education resources (OERs), and course-based undergraduate research experiences (CUREs). She is a lecturer in the Department of Chemistry & Biochemistry at Georgia Southern University and teaches Principles of Chemistry, Survey of Chemistry, and Professional Science Communication.

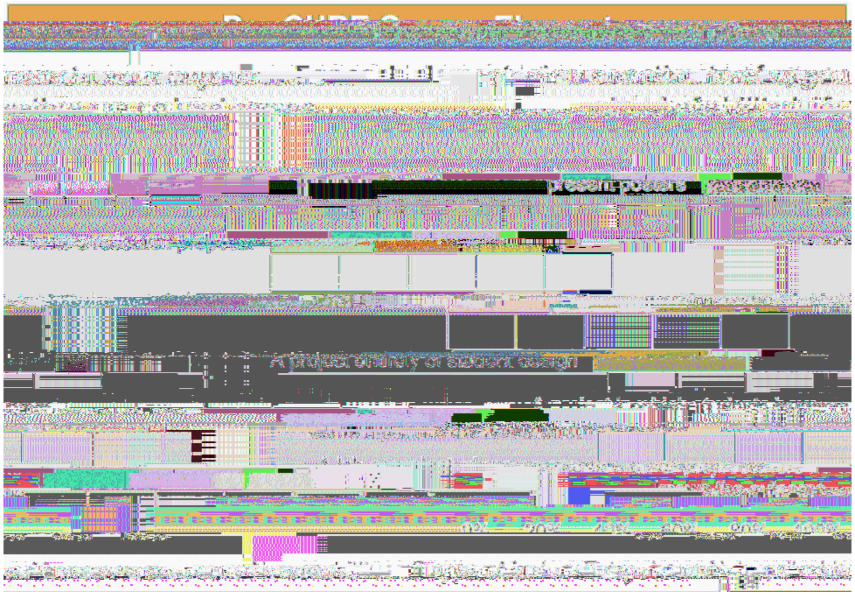
Several studies have established the positive benefits of engaging undergraduate (UG) students in authentic research experiences (Russell, Hancock, & McCullough, 2007; Williams & Reddish, 2018). UG students often participate in multi-semester research opportunities (capstone project/research credit) with a faculty member for which they must qualify/wait for an available spot in a research group. By integrating research into a one-semester teaching lab using Course-based Undergraduate Research Experiences (CUREs), we can remove this barrier to the research experience and provide students of all levels and interests the opportunity to participate in an authentic research program (Bangera & Brownell, 2014).

CURE studies have gained momentum already in the biological sciences and lower-level chemistry courses; however, the implementation is less prevalent in advanced-level chemistry courses (Williams & Reddish, 2018; Pagano, Jaworski, Lopatto, & Waterman, 2018). At GSU, we transformed the Inorganic Chemistry teaching laboratory into a CURE in Fall 2019 and found profound joy connecting teaching pedagogies with research gains. Dr. Saha created a discovery-based learning experience to engage the entire class in pursuing a common research question within the context of the course itself. The experience was quite gratifying as students were genuinely interested in the challenge and pursuit of research. To measure student understanding of the nature of the scientific research process after completing this course, Dr. Williams administered and analyzed a CURE survey previously published (Lopatto et al., 2008).

There are multiple benefits of redesigning a traditional lab course with fixed outcomes into a discovery-based lab course. For example, a CURE lab explicitly includes authentic research practices, discovery, collaboration, and iteration (Auchincloss et al., 2014) which often leads to potentially publishable research findings with UG students as coauthors. The goal of this activity was to provide all students, regardless of experience or background, an opportunity to engage in novel scientific research by participating in a CURE lab. We intended for students to gain experience with solving a research problem with potential to publish in an academic journal, synthesizing a variety of scientific data, and understanding the overall research process including grappling with failure.

Dr. Saha designed and taught the thirteen-week-long laboratory course incorporating an authentic research

These highlight important aspects of a CURE – discovery and collaboration. When asked about the potential benefits of participating in a CURE, 55% of our students reported large/very large gains in “tolerance for obstacles”, 75% in “understanding the research process”, and 60% in “understanding how scientists work on real problems” (Figure 5).



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Overall, this advanced-level CURE lab enabled students to conduct mini-research projects, train in several laboratory techniques and analytical instruments, and practice scientific writing and presentation skills. Despite challenges, developing a CURE lab was a gratifying experience. Students self-reported that they included this CURE experience in their resume as an authentic research experience! Others found the CURE lab to be far more enriching than a traditional lab, stating ÒThe free-form style of the CURE labs was more intellectually engaging than some of the more structured, guided labsÓ.

Auchincloss, L. C., et al. (2014). Assessment of course-based undergraduate research experiences: a meeting report. CBE—