

## **Making an Olin Grand Challenges Scholars Program: Co-Creating with Students**

### **Dr. Alison Wood , Franklin W. Olin College of Engineering**

Dr. Alison Wood is an assistant professor of Environmental Engineering at Olin College of Engineering. Her academic interests include water and sanitation, interdisciplinary thinking and approaches to environmental and sustainability problems, and decision making in complex systems. Dr. Wood is also pursuing her interests in the areas of equity and justice through education and engagement with context and values. She serves as the Director of Olin's Grand Challenges Scholars Program (GCSP) and the Director of the Babson-Olin-Wellesley Sustainability Certificate program, in addition to teaching courses on Modeling and Simulation, decision-making for sustainable systems, and a GCSP course using critical reflection for development of community-oriented identity, which she co-created with Dr. Robert Martello.

After graduating from Harvard University with a B.A. in Dramatic Literature, Dr. Wood worked professionally in theater and wrote and recorded two musical albums. She then returned to school to study engineering, earning a B.S. in Civil Engineering from Rutgers University. Dr. Wood then went on to earn a Master of Science in Engineering in Environmental and Water Resources Engineering and a Ph.D. in Civil Engineering from The University of Texas at Austin, while working with the Austin chapter of Engineers Without Borders.

### **Dr. Robert Martello, Franklin W. Olin College of Engineering**

Dr. Robert Martello is a Professor of the History of Science and Technology at Olin College of Engineering and recently served as Olin's Associate Dean of Faculty. A graduate of MIT's doctoral program in the History and Social Study of Science and Technology, Professor Martello has chaired and initiated efforts that re-imagined Olin's faculty reappointment and promotion, institutional outreach, curricular innovation, and student assessment approaches. He has been a member of the National Academies Study Committee on the Integration of Education in STEM, Humanities, and Arts, culminating with the release of the National Academies report "The Integration of the Humanities and Arts with Sciences, Engineering, and Medicine in Higher Education: Branches from the Same Tree." He is currently a member of the National Academies Planning Committee for the Convocation on Promotion and Tenure. Professor Martello is the author of *Midnight Ride, Industrial Dawn: Paul Revere and the Growth of American Enterprise*, a study of how Paul Revere's manufacturing career helped pioneer America's transition into the industrial age, and is currently researching Benjamin Franklin's printing and business endeavors.

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Olin College established its Grand Challenges Scholars Program (GCSP) in 2010, one of the first three programs in the country that created a set of curricular and co-curricular experiences intended to motivate and empower engineering students to address pressing 21<sup>st</sup> century global issues [1]. Olin's original program was designed collaboratively by students, faculty, and alumni, and was intended to be primarily student driven. Over time, the needs of the student body changed as Olin grew into a more established institution. Thus when a new GCSP director took over, a group of faculty, staff, and students took the opportunity to reinvent the program. The goals of this redesign process included increasing student engagement with some of the GCSP competencies and adding scaffolding to further support students' deep reflection and synthesis of lessons learned through distinct experiences [1]. (For more on this reinvention process, see [2].) Olin's "GCSP 2.0," launched in fall 2018, was again created by faculty and (current) students working together to design educational engagements that deliver a valuable GCSP experience attuned to the specific context of Olin, such as the curriculum and the culture.

While the original program design process was entirely collaborative, the redesign was a hybrid approach, with the program director providing a more centralized point of decision-making while still working closely with colleagues and students. This process was better suited to the changing circumstances at Olin and is perhaps more easily replicable at other institutions than a fully collaborative co-design. Students were highly involved in generating ideas, co-designing program components, and providing feedback on revamped program elements--all means of engagement that could be carefully scaffolded to succeed in a variety of environments [3].

A cornerstone of the revised GCSP is the course "Change the World: Personal Values, Global Impacts, and Making an Olin GCSP." This course was created and taught by a Professor of the History of Science and Technology and an Assistant Professor of Environmental Engineering (who is also Olin's GCSP Director), with significant input from students. It was another example of a co-creation process in which a few faculty leaders made final decisions based on engagement with students. The resulting course, taught for the first time in spring 2019, used a combination of individual and group projects, analytical and reflective assignments, readings, and discussions to address learning objectives of critical thinking and reflection, identity development, communication [4], and pluralism (i.e., embracing many ways of knowing and being, inspired by [5]). To continue the cycle of student co-creation, one of the small projects within the course asked students to reinvent portions of the course itself or the larger GCSP program at Olin; aspects of students' submissions are being incorporated into the second offering of the course for spring 2020. For example, one suggestion proposed modifications to a group project--in which students explored various grand challenge-like frameworks, including the NAE's report and the UN Sustainable Development Goals--to incorporate some individual components, allowing students to benefit from collaborative learning while creating space for them to dive deeper into their own ideas and priorities. In addition, student feedback on the course was solicited at several points during the semester to allow for iterative, ongoing improvement. Some suggestions were implemented almost immediately while others are being

applied for the second offering of the course. This feedback not only resulted in important improvements to the course, but also fostered a highly positive, collaborative classroom environment and culture that made the students aware of their own cognitive preferences and processes, and encouraged them to proactively take steps to maximize their engagement and learning.

In this talk, we'll introduce the salient pedagogical and structural components of this course, such as major projects, learning objectives, and classroom activities, and explain what makes them effective. We will also analyze the impacts of the semi-centralized co-creation process used to develop the course and to revise Olin's GCSP. We'll share lessons learned on how co-creation of educational experiences with students can be a learning experience as well as a productive design activity, resulting in increases in student motivation and student management of their learning processes, valuable course content creation and revision, and an enriching engagement for everyone involved.

#### References

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