

## **Numerical Problem Solving across the Curriculum with Python and MATLAB Using Interactive Coding Templates**

Description: This workshop explores Python and MATLAB templates and interactive coding notebooks for use throughout chemical engineering core courses and computational thinking as a problem solving approach. Students do not need prior Python or MATLAB programming to use these templates.

### Learning Objectives:

By the end of this workshop, participants will be able to

- Create interactive coding templates (MATLAB Live Scripts or Jupyter Notebooks using Python) for teaching chemical engineering concepts and problem-solving
- Select, run, and interact with a MATLAB Live Script or Jupyter Notebook template applied to a chemical engineering topic of their choice

Presenters: Ashlee N. Ford Versypt, Robert Hesketh, Matthew Stuber

**Ashlee N. Ford Versypt** is an Associate Professor in the Department of Chemical and Biological Engineering at the University at Buffalo (UB), The State University of New York. She is also an Affiliated Faculty in the Department of Engineering Education and Core Faculty in the Institute for Computational and Data Sciences. She received her B.S. in 2005 from the University of Oklahoma and her M.S. and Ph.D. from the University of Illinois in 2009 and 2012, respectively. In 2012-2014 Dr. Ford Versypt was a postdoc at the Massachusetts Institute of Technology. Dr. Ford Versypt started her academic career at Oklahoma State University (OSU) where she was an assistant professor 2014-2020 and then a tenured associate professor until January 2021 before moving to UB. Dr. Ford Versypt leads the Systems Biomedicine and Pharmaceuticals Laboratory. The long-term goal for her research program is to develop multiscale mathematical and computational models to enhance understanding of the mechanisms governing tissue remodeling and damage as a result of diseases and infections and to simulate the treatment of those conditions to improve human health. She has received several awards for her research, teaching, and service including the AIChE CAST Division David Himmelblau Award for Innovations in Computer-Based Chemical Engineering Education, NSF CAREER Award, ASEE Chemical Engineering Division Fahien Award, ASEE Midwest Section Outstanding Service Award, AIChE 35 Under 35, the OSU Outstanding Achievement for the Mentorship of Women, and the OSU

College of Engineering, Architecture and Technology Excellent Teacher Award. Her research program is currently funded by the National Science Foundation and the National Institutes of Health. She was the 2020-2021 Chair for the American Society for Engineering Education Chemical Engineering Division.

**Robert P. Hesketh** is a Professor of Chemical Engineering at Rowan University. He received his B.S. in 1982 from the University of Illinois and his Ph.D. from the University of Delaware in 1987. Robert's research is in reaction engineering, novel separations including supercritical fluids, crystallization and ultrafiltration, green engineering, and the chemistry of gaseous pollutant formation and destruction related to combustion processes. Robert has received over 4.4 million in external funding for educational and technical research projects. Robert has presented his educational innovations in international and national meetings and workshops including the 2002 and 1997 ASEE ChE Summer Schools. Robert's dedication to teaching has been rewarded by receiving several educational awards including the 2006 Chester F. Carlson, 2002 Robert G. Quinn Award, 1999 Ray W. Fahien Award.

**Matthew D. Stuber** is an Assistant Professor in the Department of Chemical and Biomolecular Engineering at the University of Connecticut (UConn) and a core faculty member of the Institute of Advanced Systems Engineering at UConn. He received his BChE in 2007 from the University of Minnesota – Twin Cities and his PhD in chemical engineering from the Massachusetts Institute of Technology (MIT) in 2013. Prior to joining the faculty at UConn in 2016, Dr. Stuber cofounded a water technology startup developing sustainable solutions to food-energy-water nexus challenges. At UConn, Dr. Stuber leads the Process Systems and Operations Research Laboratory whose research falls under numerical analysis with an emphasis on theory, methods, and software for mathematical programming (optimization) in model-based systems engineering. Dr. Stuber's long-term research goal is to democratize advanced modeling, simulation, and optimization tools that include making robustness integral to model-based decision-making. Recent application areas include sustainable wastewater treatment and desalination, agile manufacturing, solid tumor modeling and therapy design, solar power systems, and controlled environment agricultural systems. Dr. Stuber is the recipient of the Journal of Global Optimization Best Paper Award (2012) and the AIChE CAST Division David W. Smith Jr. Graduate Publication Award (2018), as well as a winner of UConn's Center for Teaching and Learning Mini Grant Competition and the CACHE Organization's competition for the Development of

Computational-Based Tools and Modules for Chemical Engineering Education.  
Dr. Stuber's research is currently funded by the National Science Foundation, the Air Force Research Laboratory, and the Department of Energy.