Abstract: The pharmaceutical industry is a global business sector with $1 trillion annual sales focused on performance-based products designed to address the healthcare needs of the world’s population. The industry has been recently experiencing a number of important changes in its business environment that are driving efforts to reduce overall cost while also improving product quality. While for decades pharmaceutical companies relied in outdated manufacturing facilities while investing heavily in drug discovery, the last decade they are looking for substantial investments in manufacturing upgrades. One of the most pronounced shifts is towards continuous manufacturing. The incentives for this transformation of pharmaceutical manufacturing and the reasons behind the timing of the change will be outlined in this talk. To enable this change the pharmaceutical industry has to build the necessary expertise and skills to design and effectively operate the new kind of production, and support the paradigm shift in pharmaceutical manufacturing. Continuous production requires detailed process understanding in terms of the evolution of all critical material properties as a function of its operating parameters and environmental conditions. Once process knowledge is translated into models, process systems engineering tools allows the design, analysis and optimization of continuous integrated processes. The major challenges to achieve this goal and highlights of the work that has been performed in our lab in the recent years to address these problems will also be covered in the talk.

Biography: Marianthi Ierapetritou is a Professor and Chair in the Department of Chemical and Biochemical Engineering at Rutgers University in Piscataway, New Jersey. Dr. Ierapetritou’s research focuses on the following areas: 1) process operations; (2) design and synthesis of flexible production systems focusing on pharmaceutical manufacturing; 3) modeling of reactive flow processes; and 4) metabolic engineering with focus on biopharmaceutical production. Her research is supported by several federal (FDA, NIH, NSF, ONR, NASA) and industrial grants (BMS, J&J, GSK, PSE, Bosch, Eli Lilly). Among her accomplishments are the 2016 Computing And Systems Technology (CAST) division Award in Computing in Chemical Engineering, the highest distinction in the Systems area of the American Institute of Chemical Engineers (AIChE), the Award of Division of Particulate Preparations and Design (PPD) of The Society of Powder Technology, Japan; the Outstanding Faculty Award at Rutgers; the Rutgers Board of Trustees Research Award for Scholarly Excellence; and the prestigious NSF CAREER award. She was also elected this year as a fellow of AIChE, and appointed as a Consultant to the FDA under the Advisory Committee for Pharmaceutical Science and Clinical Pharmacology. She has more than 200 publications, and has been an invited speaker to numerous national and international conferences. Dr. Ierapetritou obtained her BS from The National Technical University in Athens, Greece, her PhD from Imperial College (London, UK) in 1995 and subsequently completed her post-doctoral research at Princeton University (Princeton, NJ) before joining Rutgers University in 1998.