THE OHIO STATE UNIVERSITY

The William G. Lowrie Department of Chemical and Biomolecular Engineering Graduate Program

Cordially invites you to attend a seminar on

Biological Control Systems:

The Future of Engineering In Medicine

Babatunde A. Ogunnaike

William F. Friend Chaired Professor
Chemical Engineering Department
University of Delaware

Thursday, September 10th, 11:30 AM

Zoom Webinar URL:
https://osu.zoom.us/j/91764743611?pwd=blZQQjIxaU9HVVlVblZXa3F3NHAyQT09
Password: 944264

Bio

Babatunde A. Ogunnaike is the William L. Friend Chaired Professor of chemical engineering and, until October 1, 2019, dean of the College of Engineering at the University of Delaware. He received the B.Sc. degree in Chemical Engineering from the University of Lagos, Nigeria; the M.S. degree, in Statistics and the Ph.D. degree in Chemical Engineering both from the University of Wisconsin–Madison. He is the author or co-author of four books including a widely used textbook, *Process Dynamics, Modeling and Control*, and *Random Phenomena: Fundamentals of Probability and Statistics for Engineers*. His awards include the American Institute of Chemical Engineers 1998 CAST Computing Practice Award, the 2007 ISA Eckman Award, the 2008 AACC Control Engineering Practice award and the 2018 AIChE Warren K. Lewis Award. He was named a fellow of the American Institute of Chemical Engineers in 2009, a fellow of the American Association for the Advancement of Science in 2015; Fellow of the international Federation of Automatic Control (IFAC) in 2017; he was also elected to fellowship of the Nigerian Academy of Engineering and elected to the US National Academy of Engineering both in 2012.

Abstract

The mammalian organism maintains stable, efficient and "near-optimal" performance and *homeostasis* in the face of external and internal perturbations via distinct biological systems ranging from the large-scale *physiological* (nervous, endocrine, immune, circulatory, respiratory, etc.), to the *cellular* (growth and proliferation regulation, DNA damage repair, etc.), and the *sub-cellular* (gene expression, protein synthesis, metabolite regulation, etc). "Biological Control Systems," a sub-topic of Control Theory, arises from a control engineering perspective of the function, organization, and coordination of these multi-scale biological systems and the control mechanisms that enable them to carry out their functions effectively. In this presentation, we will provide an overview of *how* physiological life is made possible by control; demonstrate the usefulness of a control engineering perspective of pathologies for diagnosis, design, and implementation of effective treatments-especially for precision (personalized) medicine; and hence make the case for the central role engineering will play in enabling medicine of the future. The concepts and principles will be illustrated using a specific clinical example involving platelet count control for an immune thrombocytopenic purpura (ITP) patient.