



Professor Babatunde A. Ogunnaike University of Delaware

Biological Control Systems: Systems Biology of Diseases and the Design of Effective Treatments

In the Chair: Professor Claire S. Adjiman, Centre for Process
Systems Engineering, Imperial College London

Vote of Thanks: Dr Cleo Kontoravdi, Centre for Process Systems
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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, and demonstrate the usefulness of a control engineering perspective of pathologies for diagnosis, design, and implementation of effective treatments. The concepts and principles will be illustrated using three specific examples with significant research and clinical implications: Ca^{++} Regulation; TGF- β and prostate cancer; and Platelet Deficiency Control.

Biography: Babatunde A. Ogunnaike is the William L. Friend Chaired Professor of chemical engineering and 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. The Ogunnaike group is interested in understanding the dynamic behavior of complex systems through mathematical modeling and analysis, and then exploiting this understanding for postulating novel designs and improved operation. Specific systems of interest range from polymer reactors, particulate processes and extruders, to biological processes at the cellular and physiological levels. 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, and the 2008 AACC Control Engineering Practice award. He was named a fellow of the American Institute of Chemical Engineers (AIChE) in 2009, and elected a fellow of the Nigerian Academy of Engineering in 2012, and of the US National Academy of Inventors in 2014. He is a 2016 fellow of the American Association for the Advancement of Science (AAAS) and a 2017 fellow of the International Federation of Automatic Control (IFAC). He was elected to the US National Academy of Engineering in 2012.

The Twenty Fifth Professor Roger W.H. Sargent Lecture



The Professor Roger Sargent Lecture is an annual event the Centre for Process Systems Engineering inaugurated as a tribute to Professor Sargent’s vision, leadership, significant technical contributions and to his legacy in the field of Process Systems Engineering.



Professor
Babatunde A. Ogunnaike

Thursday 6 December 2018 • 17:30

Lecture Theatre 3 (Room 333), Department of Chemical Engineering, Roderic Hill Building,
South Kensington Campus, Imperial College London SW7 2AZ
Tea and coffee will be served before the lecture from 16:30 in the Common Room (Room 228)
Department of Chemical Engineering, Level 2, ACE Extension Building