

The Department of  
**Mechanical Engineering**  
PRESENTS

***Richard M. Murray, Ph.D.***

Professor  
Control and Dynamical Systems  
California Institute of Technology



**Friday, November 6, 2015**  
**WCH Room 205/206**  
**11:10-12:00PM**

***Analysis, Design and Prototyping of Biomolecular  
Circuits***

***Abstract:***

Advances over the past decade have given biological engineers new insights into the role of genetic circuits in nature and the design of biomolecular circuits to implement biological operations in vitro and in vivo. In this talk I will discuss the use of concepts from systems and control engineering as applied to the analysis and design of biological circuits. After a brief survey of relevant concepts from synthetic biology, I will present some recent results that combine modeling, analysis, design and experimental implementation of engineered biological circuits. These results include the use of biomolecular "breadboards" for prototyping and debugging engineered biomolecular circuits, and the implementation of circuits for regulation of gene expression and biomolecular event detection. Using these results as examples, I will discuss some of the open problems and research challenges in synthetic biology.

***About the Speaker:***

Richard M. Murray received the B.S. degree in Electrical Engineering from California Institute of Technology in 1985 and the M.S. and Ph.D. degrees in Electrical Engineering and Computer Sciences from the University of California, Berkeley, in 1988 and 1991, respectively. He is currently the Thomas E. and Doris Everhart Professor of Control & Dynamical Systems and Bioengineering at Caltech. Murray's research is in the application of feedback and control to networked systems, with applications in biology and autonomy. Current projects include verification and validation of distributed embedded systems, analysis of insect flight control systems, and biological circuit design.