



Princeton University
Department of Electrical Engineering
Information Sciences and Systems (ISS)
Seminar ELE 519-Spring 2008

Speaker: Desmond Lun, Computational Biologist, MIT

Date: Thursday, April 24th

Time: 4:30pm

Room: B205 ~ Equad

Title: Designing Synthetic Biological Networks

Abstract: The engineering of simple living organisms such as microbes in a well-defined, systematic manner---in much the same way as computer systems or communication systems are engineered---has recently emerged as an exciting, realizable prospect. Such engineering, which is often referred to as synthetic biology, promises new, improved ways of producing drugs and fuels as well as to serve functions that are yet to be imagined. But, as with all engineering, synthetic biology requires design, and, at present, few design tools or principles exist for synthetic biology. In this talk, we discuss how mathematical optimization can be used to aid the design of synthetic microbes. In particular, we focus on the problem of engineering *E. coli* to produce biofuel and discuss a network optimization problem that arises in this context. We outline a local-search heuristic that we have implemented to tackle this problem, and we discuss potential areas for improvement as well as general future directions in the nascent field of analytical design for synthetic biology.

Bio: Desmond Lun is a Computational Biologist at the Broad Institute of MIT and Harvard and a Research Fellow in Genetics at Harvard Medical School. Prior to his present position, he was a Postdoctoral Research Associate in the Coordinated Science Laboratory at the University of Illinois at Urbana-Champaign. He received bachelor's degrees in mathematics and computer engineering from the University of Melbourne, Australia in 2001, and S.M. and Ph.D. degrees in electrical engineering and computer science from MIT in 2002 and 2006, respectively. Dr. Lun's research interests are in networking and in synthetic and systems biology. He is co-author, with Tracey Ho, of "Network Coding: An Introduction," forthcoming from Cambridge University Press.