

The **Department of Mathematical Sciences** presents a colloquium with

Professor Daniel Forger

University of Michigan

Thursday, November 7, 2012

4:30 – 5:30 pm

Room 119 60WCharlton

Jetlag: Optimal Light Treatments for Re-entrainment in Minimum Time

Jet lag describes a collection of symptoms caused by rapid travel across time zones, as well as shift work, social pressures, and disease. Jet lag is characterized by circadian misalignment, a condition in which the timing of the circadian (daily) clock disagrees with the timing of environmental cues. Light is the strongest signal to change the timing of, or to shift, the circadian clock. Here we find mathematically optimal protocols, or schedules, of light exposure predicted by the models to correct circadian misalignment in minimum time. We find that the optimal light level jumps between its maximum and minimum admissible values, leading us to suggest that the clock can be rapidly shifted by controlling only the timing of the start and end of the day. Moreover, we find two distinct strategies for fast shifting. For larger phase shifts and when more light is available, the optimal strategy uses partial circadian amplitude suppression. For smaller shifts and when less light is available, the optimal strategy uses very little amplitude suppression. These schedules, and the methodology used to compute them, could be used in the design of light therapy for a variety of circadian disorders. The latter half of the talk will focus on modeling the physiology of circadian timekeeping and, in particular, how timing is generated on the genetic, cellular, and neuronal network scale.

Refreshments will be served at 3:15 pm
in the Faculty & Graduate Student Lounge
Room 4118 French Hall