

# Graduate Seminar in Mathematics

Julie Rose, MUN

Friday, March 1, 2013

2:00-2:50pm.

HH-3017

## A Mathematical Model of the Human Sleep-Wake Cycle

### Abstract:

Over the past century, the human sleep-wake cycle has been extensively researched from the viewpoints of various subjects such as biology, neurology and even mathematics. However, room for improvement still exists, when considering the current mathematical models of the sleep-wake system. Specific neuronal populations in the brain - specifically, in the hypothalamus - fire in rhythmic circadian patterns that control the sleep wake cycle. Multiple mathematical approaches analyze and attempt to reproduce the activities of these specific neuronal populations. My presentation will outline a detailed overview of one such model, namely the biologically-based mathematical model of the sleep-wake cycle constructed by Rempe et al. in 2010. Here, I will introduce my own modifications to the ODE system created by Rempe et al. Moreover, I would like to briefly discuss my future research, which would involve the application of delay differential equations to more accurately model the sleep wake cycle. In conclusion, my overall aim is to introduce these alterations to the Rempe et al. model, whose results should more closely mirror the biological delays seen in the human physiology of the sleep wake cycle.

