MEng Design Project Announcement – 2017-18 AY

**Project title:** Understanding medical times-series data using statistical tools and machine learning tools

**Brief Description of Design Project Goals:**

**Overview:** Many types of data come in the form of time series where some quantity is repeatedly measured. Several goals are possible. For instance, (1) to determine a mathematical model of the time-evolution of the measured quantity (such a model might be of great interest for predicting the future) or (2) given two times series, to determine whether they are “the same” or “different” in a statistical sense (such a decision might be important when testing medical treatments). I have worked with physicians focused on the study and treatment of alcohol abuse and the time-series of interest concerns patterns of drinking. Because time series problems usually have an idea of causality, there are extensive, computationally-practical statistical tools such as discrete-time Markov chains that can be employed. In addition, many modern machine learning tools can be applied in the context of time series.

**Specific MEng Contribution:** Using the tools outlined above, solve Problem (1) or (2) listed above!

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**Number of MEng Students Needed:** One or two.

**Required Skills:** The project needs students with a balance of “algorithms” interests, especially statistical and deep learning, and “computation” interests. As much as possible I would like to take advantage of existing software frameworks such as Python, Matlab, Google TensorFlow, and so forth. But this means that there will be some pure software deployment effort since getting consistent versions of all the interacting packages is usually a challenge.

**Estimated Project Time Frame:**

2017-18 Academic Year, Two (2) Semesters