Example Description

- **D2L2 Reinforcement Learning:** Reinforcement learning has been used as a model of behavior in psychology, economics, and computer science. The central maxim of reinforcement learning is the "Law of Effect" (Thorndike 1898). It states that the likelihood of implementing an action will increase with the success of that action. In economics, simple action-reinforcement models have been applied to explaining human behavior in individual tasks, strategic games, and markets since the early 90s. More recently, there has been a revival of interest in reinforcement learning. In particular, the focus has been on incorporating a richer class of models from the computer science literature known as Q-learning.

  The goals of the lectures on reinforcement learning would be to: first, introduce students to the seminal class of action-reinforcement models in economics (e.g., Roth and Erev 1995); second, provide a connection to more complex models, such as Q-learning; and third, to highlight existing challenges and open questions in the literature that uses reinforcement learning. Students will work in groups to replicate results from the literature and propose a project that either extends the existing result or applies the model to novel contexts.
  - **List of Papers**: Roth and Erev (1995, 1998), Feltovich (2000), Hanaki, Sethi, Erev, and Peterhansl (2005), Waltman, L. and K. Uzay (2008)
  - **Example code**: Replication of Figure 3 in Erev & Roth (1998)
  - **Programming Exercise**: learning across strategies for repeated PD. Details: Consider 5 memory-1 strategies that are common in the repeated PD literature (ALLC, ALLD, TFT, GT, DTFT), and use RL approach to simulate learning across repeated games when agent learn across strategies.