Semester Project Topic

- **Project title:** Agent-based model of firefly mating strategy
- **Individual:** Dieu My Nguyen
- **Language/toolsets for code:** Python and its common packages (e.g. numpy, matplotlib, pandas, math, possibly pygame for some GUI, etc.)
- **Project idea:** I would like to do something a bit different than a web or mobile app. To make use of the concepts from this class for my PhD research, I would like to build an agent-based model to simulate firefly mating behaviors using an OODA framework.

  Briefly, an agent-based model is a collection of interacting agents, each being an encapsulated bundle of data and methods that allow the agents to act in an environment. Notably, the agents typically have limited behaviors, i.e. they have knowledge of a small spatial area around them, but not of the global environment. Yet, complex global patterns emerge from the local interactions between individuals. Fireflies will be the individual agents divided into different types based on attributes and behaviors (i.e. female, male, or even finer distinctions) and they exist in some 2D environment (for simplicity). In the dark, a female will need to perform some sort of tracking of male flashes and select a mate for herself. This is an interesting and unexplored computational problem involving signal detection theory, insect decision-making, perhaps alse temporal difference learning.

  After being introduced to core OODA concepts in this class, I can immediately see the applicability of the OODA perspective for this model. Ultimately, I will be sharing this with the biology community (via presentations/publications). I think a clean and cohesive code with an easily understandable user interface will benefit other biologists who would like to explore this biological problem but may not want all the complicated implementation details. As I am in working in interdisciplinary research in both computer science and biology, I am excited to use OODA concepts to build something to share with both communities while working towards my dissertation. I know it's a bit different, but I hope you will approve!