ABE591S Principles of Systems & Synthetic Biology

For class, we will be discussing 1 paper where the authors use innovative techniques to learn from nature and/or harness natural processes to create superior organisms that address a contemporary issue. ***Students are expected to read all three papers and be prepared to discuss the major lessons in the context of the course materials***. General principles from these papers are testable! To guide the conversation, each paper is assigned to a group of students along with some questions to lead the discussion. Groups can prepare any material they would like in advance (e.g. notes, slides, etc) to lead the discussion. You may want to consult the relevant supplemental sections for each paper for detail and/or cited papers (not provided) for further details. **Each group will lead discussion for 20 minutes**. This activity is graded as part of the Journal Club Discussions.

Discussion Questions (all papers)

1. What were the main objectives of the study? How do these relate to material discussed in class to date? This may include human practices/responsible synthetic biology
2. What were the main conclusions of the study? How did they achieve them?
3. Compare the methods discussed to those described in class. What were the foundational principle used? Critically analyze the rationale for the methods chosen. What are the advantages? Limitations?
4. What are the general lessons that can be extrapolated here?

Groups

10. Kan et al. 2016. Directed evolution of cytochrome c for carbon–silicon bond formation: Bringing silicon to life. *Science.* **354**: 1048-1051.

1. What is the problem the authors set out to resolve?
2. How do they select the starting protein for directed evolution? Why do they select M100 as an initial target for mutation?
3. What method do they use to create library diversity?
4. What do they learn from their M100D mutant that allows them to iterate and improve on their design?
5. What is the end result of the study?