

20.305 / 20.405 / 6.580 / 6.589
Principles of Synthetic Biology
Course Syllabus

Instructors

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Learning outcomes

Students will learn how to:

- Use modern DNA assembly techniques to build biological circuits
- Design advanced biological circuits with several levels of control:
 - Pre/post transcriptional regulation
 - RNA-based regulation
 - Protein-protein interactions
- Implement design principles taught in the course:
 - Circuit logic and minimization
 - Hazard analysis
 - Input-output matching
- Write ordinary differential equation models to describe biological circuits
- Simulate biological circuit behavior using MATLAB

Grading

Grading will be based on:

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|---|-----------|
| - Five graded problem-sets | 25% |
| - Two exams (midterm and final) | 25% + 35% |
| - A final project (second half of the semester) | 15% |

Prerequisites

Students interesting in taking the class should have a basic understanding of:

- cell biology (e.g. internal structure of cells),
- molecular biology (e.g. enzymatic catalysis),
- genetics (e.g. structure of genes, transcription & translation)
- basic chemistry (e.g. writing reaction rates)

The class material is available on MITx using this link:

https://lms.mitx.mit.edu/courses/course-v1:MITx+20.305r_4+2019_Fall/course/