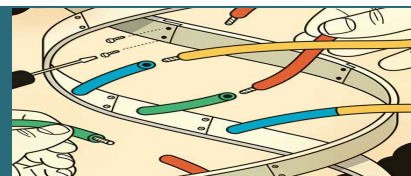


Molecular Synthetic Biology

Syllabus for BME 598/494 – Spring 2016



Course Information

Professor Dr. Karmella Haynes
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Office hours By appointment only

Classroom **ECG G140**

Schedule Tues, Thurs, 10:30 – 11:45 am

Molecular Synthetic Biology will focus on **molecular biology** and **empirical data collection**, and their **relationship with mathematical models**. Familiarity with molecular biology (DNA, RNA, & proteins), calculus, and basic engineering language are strongly recommended. **BME598 Assignments** will culminate as a design project proposal to support Ph.D.-level training. **BME494 Assignments** will culminate as a written report and oral presentation to share your design/ test/ build process.

Content Overview

The field of **synthetic biology** is based on the premise that living systems are modular, and thus, able to be engineered. This idea has spurred a growing movement and has made a big impact on application-driven molecular biology.

Unit 1: DESIGN

We will review how fundamental biology concepts (such as the “gene”) and engineering concepts are integrated in synthetic biology. You will design a biological “device” as the basis for a final project proposal/ report.

Unit 2: BUILD

You will learn techniques for constructing synthetic DNA for useful applications. You will complete a strategy for building your device.

Unit 3: TEST

You will learn experimental and mathematical modeling techniques for testing the function of synthetic biology systems. You will propose assays to validate your new system.

- Assignment load – *Substantial*
- Class attendance – *Critical* (no extra review sessions)
- Independent Critical Thinking – *Highly frequent*
- Beginner-Level Material Offered – *Very little*

Course Materials

Reading: reading materials will be posted on Blackboard

Hardware: bring a laptop computer to class (strongly recommended)

Computer software: Safari/Chrome internet browser, Microsoft Office, MATLAB, ImageJ

Key Calendar Dates

Session C: 15 weeks

- 1/14 First class
- 2/11 Unit 1 Exam (due 2/16)
- 2/18 No class (MLK Day)
- 3/08 No class (Spring break)
- 3/10 No class (Spring break)
- 3/24 Unit 2 Exam (due 3/29)
- 4/26 Final projects due
- 4/28 Unit 3 Exam (due 5/03)

A complete daily schedule & policies will be posted online.

BME 598 Assignments

Problem Sets - ~2/Unit, 6 total – 12%
Article Summaries - 1/Unit, 3 total – 15%
Proposal Drafts - 1/Unit, 3 total – 18%
Exams (Take-home) - 1/Unit, 3 total – 30%
Final – 25%. Finished project proposal

BME 494 Assignments

Graded Participation - 2/Unit, 6 total – 12%
Discussion Notes - 1/Unit, 3 total – 15%
Presentations - 1/Unit, 3 total – 18%
Exams (Take-home) - 1/Unit, 3 total – 30%
Final – 25%. Finished project proposal

Policies - Only 2 make-up assignments will be allowed. Exams can be re-scheduled, but only prior to the **assignment** date (e.g., 2/11), and must be submitted up to 1 week after the original **due** date (e.g., 2/23).

Grading Scale 100..97 ..94 ..90 ..87 ..84 ..80 ..77 ..74 ..70 ..67 ..64 ..60 <60
A+ A A- B+ B B- C+ C C- D+ D D- E