Advanced Synthetic Biology

Syllabus for BME 598 – Fall 2012

INFORMATION

Professor	Dr. Karmella Haynes Office: ISTB4, 273 Phone: 480-965-4636 E-mail: karmella.haynes@asu.edu
Office hours	By appointment only
Classroom	**ECG G319**
Schedule	M, W, 4:30 – 5:45 pm

Advanced Synthetic Biology

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 new movement and has made a big impact on application-driven molecular biology. The course will review foundational and recently published work, and reinforce technical information with hands-on exercises (*e.g.*, biological device planning, math modeling, computer simulations, database mining).

The course 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. Assignments will culminate as a design project proposal to support Ph.D.-level training.

Complete daily schedule & policies will be posted online.

OVERVIEW

Unit 1: **Biological Parts**
Evolutionary biology & conservation, tunable molecular functions, DNA & protein synthesis

Unit 2: **Living Machines – engineering principles in biology**
Modular design, Stable states, logic evaluators, dynamic functions, learning by building

Unit 3: **Applying devices in the real world**
Signal amplification, noise, robustness, stochasticity, biosafety containment

COURSE WORK

In-class Exercises (2/Unit, 6 total): guided walk-throughs of computing tools for Syn. Bio.
Problem Sets (2/Unit, 6 total): solve problems using tools from the In-class Exercises
Article Summaries (2/Unit, 6 total):
Project Proposal Stages (1/Unit, 3 total): drafts of the final project proposal
Exams (1/ Unit, 3 total): Take-home essay-style exams, typically 4 questions each
Final: 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.*, 9/24), and must be submitted up to 1 week after the original ***due*** date (*e.g.*, 9/26).

Grading

Problem Sets 24%, Project Proposal Stages 18%, Exams 30%, Final 25%

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**

REQUIRED MATERIALS

Reading: reading materials will be posted on Blackboard
Hardware: laptop computer is strongly recommended
Computer software: Safari internet browser, Microsoft Office, MATLAB, ImageJ

KEY CALENDAR DATES

Session C: 15 weeks

9/3	No class (Labor Day)
9/24	Unit 1 Exam (due 9/26)
10/15	No class (Fall break)
10/29	Unit 2 Exam (due 10/31)
11/12	No class (Vet's day)
12/3	Unit 3 Exam (due 12/5)
12/19	Final due