Engineered Genetic Polkadots
2004 IAP

Instructors
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Location
Lectures & Discussions (12-2p)
Mon. & Fri.  68-474
Tues., Wed., & Thurs. 68-364

Work Desks  68-580
Work Room Phone  (617) 324-0063

Note: Bldg. 68 is a primary research building. Please do not venture into labs w/o permission. Contact Drew Endy (info. above) whenever needed.

Evacuation: In case of fire drill or actual evacuation please rally at the plaza (or, in the lobby if weather demands) of the Whitehead Institute (across Main Street). If the Whitehead Institute is under attack by Godzilla etc., the secondary rally point is the Medial Lab plaza (across Ames Street) or lobby (weather driven).

Lunch
Some form of food will be provided. Feel free to BYO if you prefer.

Course Website
http://polkadots.mit.edu/
STELLAR course website coming online this week

Note on System Design and System Fabrication
Our goal is to have DNA encoding each system fully specified by the end of the 3rd week of the class (1/23) so that we can do real-time editing of the sequence and additional system specification during the 4th week. Our goal is to “push-the-button” for DNA synthesis during the last scheduled class, Thursday 1/29/03.
Course Outline

1/5 Monday

Review of syllabus and course plan (Endy)
Patterns in biology (Silver)
Making Patterns (Nagpal)
Introduction to synthetic biology (Endy)
Engineering biology (Rettberg)

Assignment #1: Form Project Teams (report back start of class tomorrow)

Reading #1: Background reading on:
(i) gene expression in bacteria,
(ii) cell-cell signaling,
(iii) engineering.

After-class tutorial: How to find what you need to know? (Knight)

1/6 Tuesday

Assignment #1 due – report back with team and team name
Programming patterns (Nagpal)
Gene expression in bacteria (Endy)
Cell-cell signaling (Silver)
Paint for polkadots (Endy & Silver)

Assignment #2: Annotate the “Synchronator” (team reports in class Monday 1/12)

Assignment #3: System pre-proposal (team reports in class Thursday 1/8)

Reading #2: Turing paper on pattern formation

After-class tutorial: How to annotate DNA sequence? (Knight)

1/7 Wednesday

From details to a device: PDL inverting amplifier (Endy)
From details to a device: Signaling channel (Knight)

1/8 Thursday

Assignment #3 due – system pre-proposal reports (each team)
Specification of your system (Rettberg)
- What do you have to do?
- Do you need a simulation?
- Do you need parts? Do you need to share parts?
- How will somebody debug your system?
- How do you know when you are done?

Assignment #4: System proposal (team reports in class Monday 1/12)

1/9 Friday

“Nuts & Bolts” (Rettberg & Endy)
Course Outline (continued)

1/12 Monday

Assignment #2 due – Sychronator annotation (all teams, round robin in class annotation)
Assignment #4 due – system proposal reports (each team)
Assignment #5 – What parts do you need to make your system?

1/13 Tuesday

Assignment #5 due – Parts report and jamboree (each/all teams)
Assignment #6 – What parts will my team specify? What parts will I get from the Registry or from other teams?

1/14 Wednesday

Assignment #6 due – Where are my parts coming from (each team)
Assignment #7 – Specify your parts and systems

1/15 Thursday

1/16 Friday

Reading #3 – Risks and ethics and synthetic biology

1/19 Monday

Discussion – Risks and ethics and synthetic biology (Endy)

1/20 Tuesday

1/21 Wednesday

Discussion – What’s synthetic biology good for anyway? Applications jam session (Rettberg)

1/22 Thursday

1/23 Friday

Assignment #7 due – System specification briefings (each team)

1/26 Monday

Assessment of system specifications, final “to do” list (instructors)
Assignment #8 – Finish!

1/27 Tuesday [don’t forget MITHenge, http://web.mit.edu/mithenge/]

1/28 Wednesday

1/29 Thursday

Assignment #8 due – Final system specification reports due.
Send DNA sequence for synthesis