

Leslie



Welcome to FI5 20.109!

1. ✓ Introductions & 20.109 Mission
2. Intro to Wiki & Semester Overview
3. Daily Operations
4. Lab Safety
5. Lab Notebook
6. Lab Tour (...your first protocol!)

20.109 mission

- Aim 1: Novel investigations

Real expt → unknown results

- Aim 2: Authentic communication

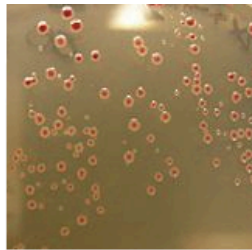
best practices + feedback

- Aim 3: Integrity-based collaboration

- Contributions to team assignments

- Independent completion of individual assignments

Your new best friend: *the 20.109 wiki*



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Tools

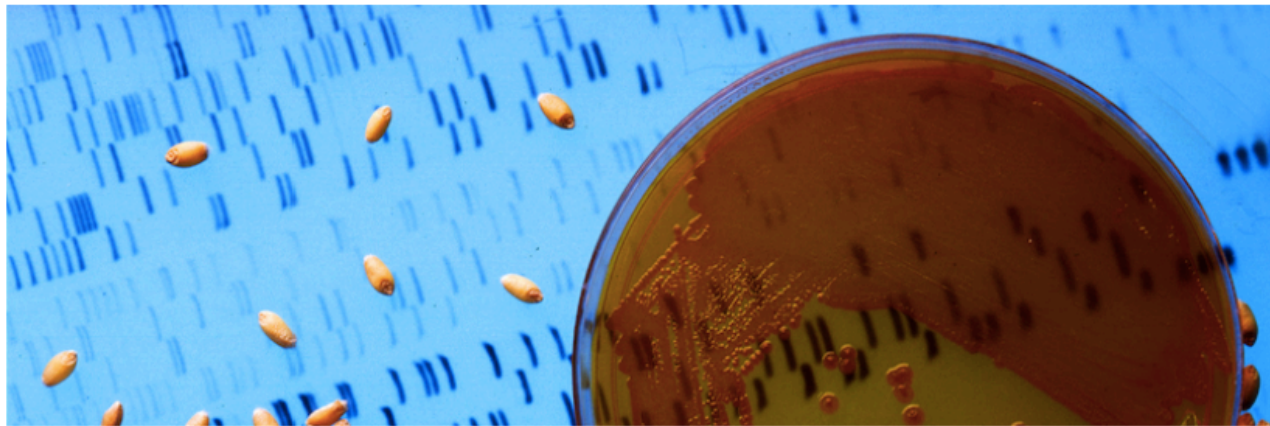
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20.109(F15)

20.109(F15): Laboratory Fundamentals of Biological Engineering



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[DNA Engineering](#) [Protein Engineering](#) [Biomaterials Engineering](#)

Welcome and details for fall 2015

Lecture: T/R 11-12 (16-220)

Lab: T/R 1-5 or W/F 1-5 (56-322)

People: Instructor and student web pages may be found at the linked [People](#) page.

Welcome to 20.109! For some of you this will be the first time in a research lab and for others it will not; either way, it is our goal to make this class a useful and fun introduction to experiments and techniques in biological engineering. There is not time enough to show you

<http://engineerbiology.org/wiki/20.109%28F15%29>

book
mark:

↳ 20.109

↳ Fall 2015

Semester overview: schedule

MODULE	DAY	DATE	LECTURER	LABORATORY EXPERIMENTS	ASSIGNMENTS
		R/F Sept 10/11	NLL ↗	Orientation	
1	1	T/W Sept 15/16	BE ↗	DNA engineering using PCR	Lab orientation quiz Homework due
1	2	R/F Sept 17/18	BE ↗	Clean and cut DNA	
1	3	T/W Sept 22/23	BE ↗	Agarose gel electrophoresis	Homework due
1	4	R/F Sept 24/25	BE ↗	Ligation & transformation	Lab quiz Homework due
1	5	T/W Sept 29/30	NLL ↗	Examine candidate clones and tissue culture	Homework due
1	6	R/F Oct 1/2	BE ↗	Lipofection	Homework due
1	7	T/W Oct 6/7	BE ↗	Data analysis	Lab quiz Homework due
2	1	R/F Oct 8/9	NLL ↗	Evaluate mutations and site-directed mutagenesis	Homework due
		T/W Oct 13/14		Columbus day holiday	DNA engineering summary draft due Tue, Oct 13 at 5 pm

The secret to 20.109: Time Management

Assignments in 20.109

Major assignments (80%)

MODULE	TOPIC	ASSIGNMENT	GRADING
1	DNA Engineering	Summary	15%
		Mini-presentation	5%
2	Protein Engineering	Research report	25%
		Journal club presentation	10%
3	Biomaterials Engineering	Research proposal presentation	20%
		Mini-report	5%

Daily Work (20%)

- Notebook
- Quizzes
- Homework
- Participation
- Blog posts

Daily Operations:

- Hand in homework- receive graded homework
- Lab Treat: 15 points, ~15minutes (2X per module)

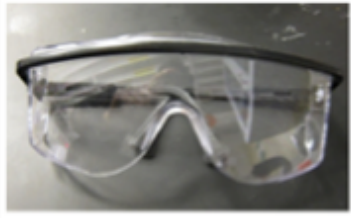



- Pre-lab lecture & discussion
- The fun stuff = science!

The key to daily 20.109: *The wiki is your friend*

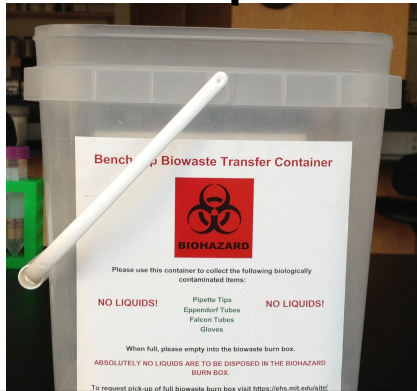
Nothing main lab → tissue culture

Personal Protective Equipment (PPE)

Item	Required	Recommended
Safety glasses 	<ul style="list-style-type: none">• At hood. <i>fume</i>• When using ethanol burners.• Add face shield at UV transilluminator.	<ul style="list-style-type: none">• Large quantities of liquid or powder (even if not strictly hazardous) due to chance of irritation by splash, dust, etc.
Lab coat 	<ul style="list-style-type: none">• At hood. <i>fume</i>• In TC room. <p><i>bio material</i></p>	<ul style="list-style-type: none">• See above.
Gloves <i>almost always</i> 	<ul style="list-style-type: none">• Working with hazardous materials (w/r/t chem or bio).• Nitrile for greater hazards (e.g., EtBr).	<ul style="list-style-type: none">• Working with any material.• Touching gloves-on equipment.

Managing Biological Waste:

Benchttop waste:



Empty daily

tips
gloves
tubes
pipettes

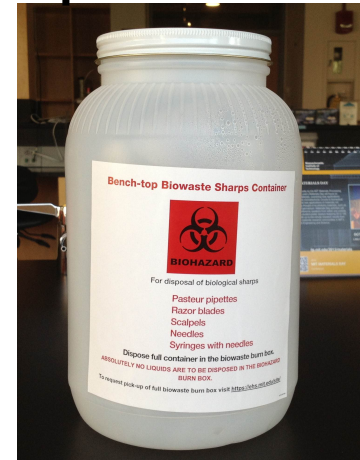
NO LIQUIDS!

Biowaste Box:



plates
pipettes

Sharps container:



glass -
tubes
pipettes

Lab Notebooks: Evernote (evernote.com)

The screenshot displays the Evernote Premium web interface. The top navigation bar includes the user's email (LESLIEMM@MIT.EDU), a search bar, and options to create a new note or chat. The left sidebar shows a 'Work Chat' section with 'Recent Notes' (F15 order list, 20.109(F15) ToDo, 20.109 enzymes, Deck staining, F15 DNA stocks) and 'Notes' (Notes, Notebooks, Atlas, Market). The main content area is titled '20.109(S15)_Jennifer' and shows a calendar view of notes. The selected note, 'M3D2: Biotemplating on Phage Nanowires', is dated April 17, 2015. The note content includes a 'Purpose' section (to biotemplate M13 phage with TiO2) and a 'Protocols' section. The protocols section is divided into 'Part 1: React AuNP:phage with Ti(I-pro)4', which includes a safety warning: 'Today's lab has some safety hazards and you must work extremely carefully. Lab coats, gloves and goggles are a must when you're at the chemical hood. The reaction of the complexed phage with the titanium will take place in the hood at supercooled temperatures (a bath at ~ -40°C). Once the titanium has been deposited on the surface of the phage, the solution is less hazardous, though you should still treat the materials with care since no reactions run to completion.' Below the text, there is a small image showing a laboratory setup with a beaker and a pipette.

Evernote Premium

LESLEIEMM@MIT.EDU

+ New Note in 20.109(S15)_Jennifer

New Chat

Search notes

20.109(S15)_Jennifer

click to add tags

Created: Apr 17, 2015 Updated: May 8, 2015 openwetware.org

You are viewing a note that is shared with 6 people

M3D2: Biotemplating on Phage Nanowires

April 17, 2015

Purpose

To biotemplate the M13 phage with TiO₂ and prepare a TEM grid.

Protocols

Today in lab you will react your Au:phage with titanium isopropoxide, harvest a small aliquot to visualize with TEM next time, and then wash the remainder of the nanowires several times – first with ethanol, and then with water. You will have time during these steps to work on the FNW, a first step toward developing a research proposal idea. Next time, you'll share your FNW findings with your partner.

Part 1: React AuNP:phage with Ti(I-pro)4

Today's lab has some safety hazards and you must work extremely carefully. Lab coats, gloves and goggles are a must when you're at the chemical hood. The reaction of the complexed phage with the titanium will take place in the hood at supercooled temperatures (a bath at ~ -40°C). Once the titanium has been deposited on the surface of the phage, the solution is less hazardous, though you should still treat the materials with care since no reactions run to completion.

For all groups:

Chill your complexed phage on ice on your bench until you are ready to

Evernote Lab Notebooks:

- Register for an Evernote account and create a 20.109 notebook.
- Please use your name in the title of your notebook
 - For example: 20.109(F15)_Leslie
- Read the wiki page called “Guidelines for maintaining your lab notebook” (under Assignments tab)

IMPT: Share your evernote lab notebooks with:

- me (lesliemm@mit.edu)
- Maxine (jonas_m@mit.edu)
- Andee (andreakw@mit.edu)

Today in the lab:

- Find your lab partner, pick your bench, check out your space, and sign up on the lab map up front!
- Complete lab orientation
- Check out the homework for MIDI (due on Wednesday, 9/16).
- Respond to the Office Hours doodle poll later today