

Welcome to 20.109(Fa17) T/R section!

Laboratory fundamentals of biological engineering

Leslie McClain

lesliemm@mit.edu

56-341c (across the hall)



MOD0: Orientation/Lab Tour

09/07/17

1. EHS training
2. Let's get to know each other
3. Intro to 20.109 lab
4. Start lab orientation: your first protocol!
5. Prep for M1D1

The pillars of 20.109

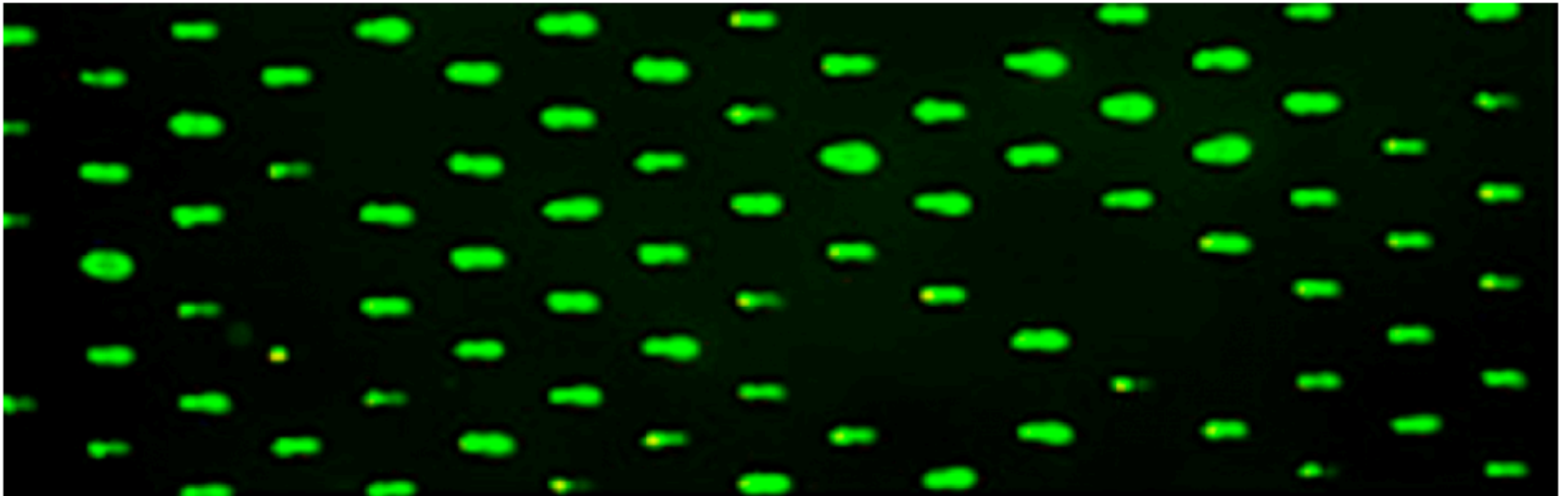
- **Authentic science**
 - elements of design, unknown outcomes
- Focus on **communicating** your science
 - written & oral, in homework and assignments, a lot of feedback
- **Collaboration**
 - work in pairs
 - assignments are both team and individually completed (as noted)
 - class-wide collaboration (for data acquisition and analysis)
 - punctuality
 - integrity (*personal* reflections)
 - We faculty love being there for you: **come to us with questions!**

BOOKMARK ME

The wiki is your best friend

[http://engineerbiology.org/wiki/20.109\(F17\) :_Fall_2017_Schedule](http://engineerbiology.org/wiki/20.109(F17) :_Fall_2017_Schedule)

20.109(F17): Laboratory Fundamentals of Biological Engineering










Fa17 Schedule	Announcements	Assignments	Homework	Communication
1. Measuring Genomic Instability	2. Manipulating Metabolism	3. Engineering Biomaterials		

The wiki will help you with **time management**

In particular, check these tabs :

- Schedule
- Assignments
- Homework

MODULE	DAY	DATE	LECTURER	LABORATORY EXPERIMENTS	ASSIGNMENTS
		R/F Sept 7/8	NLL  Orientation lecture	Orientation	
1	1	T/W Sept 12/13	BE 	Prepare microwell array and practice tissue culture	Laboratory orientation quiz Homework due
1	2	R/F Sept 14/15	NLL 	Develop experiment to optimize cell loading	Homework due
1	3	T/W Sept 19/20	BE 	Evaluate cell loading results	Laboratory quiz Homework due
1	4	R/F Sept 21/22	BE 	Test role of biochemical factors in genomic stability	Homework due
1	5	T/W Sept 26/27	BE 	Complete biochemical experiment and apply chemical treatments for sub-nuclear foci assay	Laboratory quiz Homework due
		R/F Sept 28/29	BE 	Lecture, but no laboratory Career fair student holiday	

20.109 assignments

Module	Assignment	% final grade	Due date
1	Data summary	15	10/09 (draft) and 10/22
1	Mini-presentation	5	10/14
2	Journal club presentation	15	10/24 or 10/31
2	Research article	20	11/20
3	Research proposal presentation	20	12/7
3	Mini-report	5	12/11
all	Homework and Lab notebook	10	daily
all	Participation and blog	5	Before last day of module
all	Quizzes	5	2 per module

individual : 60%

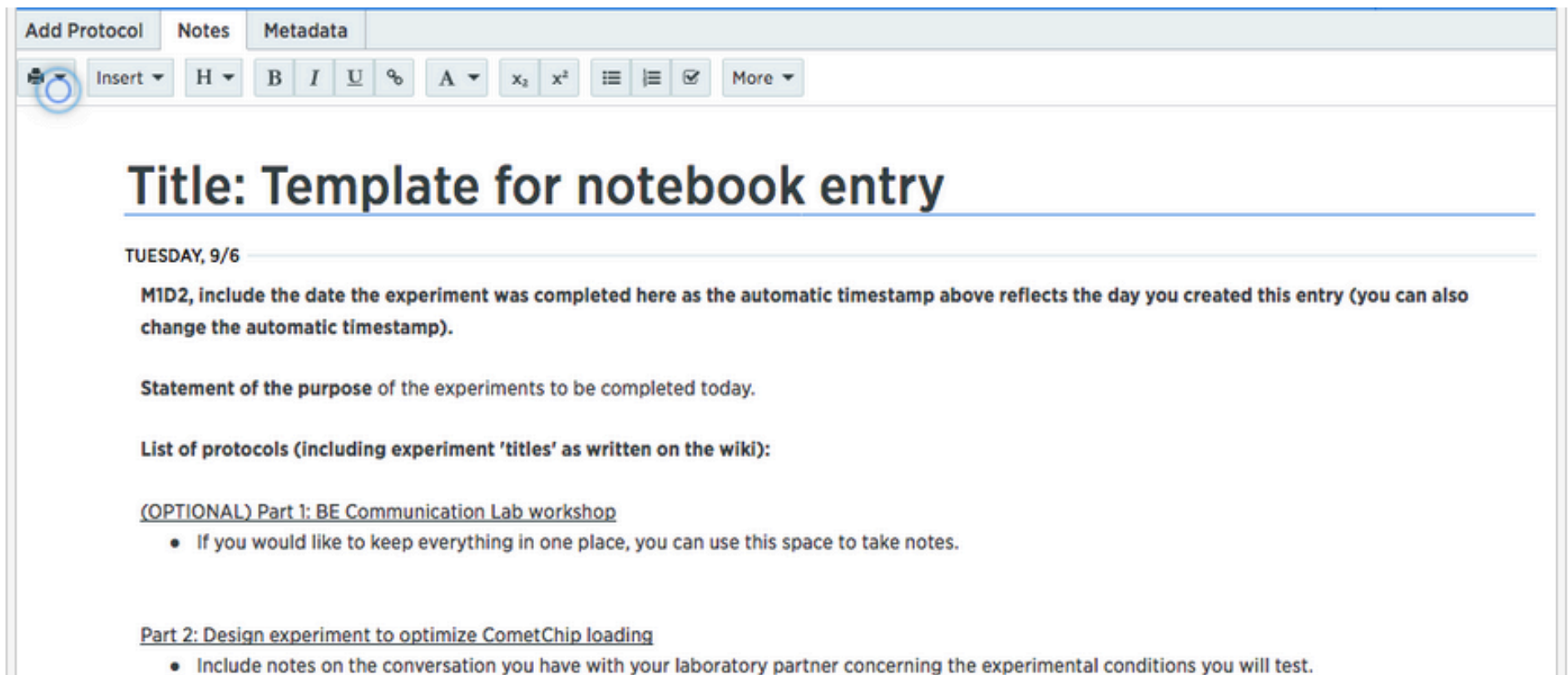
team: 40%

Homework builds your major assignments

- Only 10% of final grade?!
- Give it your best:
 - consider homework a first draft
 - never gratuitous, building blocks toward final reports and oral presentations
 - we give a lot of feedback (will prove helpful)
 - great tool to keep ahead of the game and pace your work

Lab notebook in Benchling

- Set up an account: benchling.com
- Entitle your project “20.109(F17)_YourName”
- Share with Leslie & Eric: lesliemm@mit.edu & elehnhar@mit.edu



The screenshot displays the Benchling lab notebook interface. At the top, there are tabs for 'Add Protocol', 'Notes', and 'Metadata'. Below these is a rich text editor toolbar with icons for undo, insert, heading (H), bold (B), italic (I), underline (U), link, text color (A), subscript (x₂), superscript (x²), bulleted list, numbered list, checkmark, and a 'More' dropdown. The main content area has a title 'Title: Template for notebook entry' underlined. Below the title is a date field showing 'TUESDAY, 9/6'. The body of the notebook contains several sections: a paragraph about M1D2, a section for the purpose of experiments, a list of protocols, and two optional parts. The first optional part is 'Part 1: BE Communication Lab workshop' with a bullet point about taking notes. The second optional part is 'Part 2: Design experiment to optimize CometChip loading' with a bullet point about including notes on the conversation with a laboratory partner.

Add Protocol Notes Metadata

Insert H B I U A x₂ x² ☰ ☷ ☑ More

Title: Template for notebook entry

TUESDAY, 9/6

M1D2, include the date the experiment was completed here as the automatic timestamp above reflects the day you created this entry (you can also change the automatic timestamp).

Statement of the purpose of the experiments to be completed today.

List of protocols (including experiment 'titles' as written on the wiki):

(OPTIONAL) Part 1: BE Communication Lab workshop

- If you would like to keep everything in one place, you can use this space to take notes.

Part 2: Design experiment to optimize CometChip loading

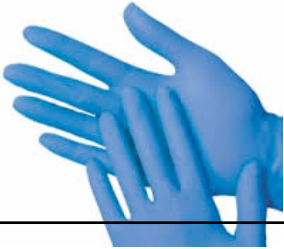


- Include notes on the conversation you have with your laboratory partner concerning the experimental conditions you will test.

A typical day in 20.109...

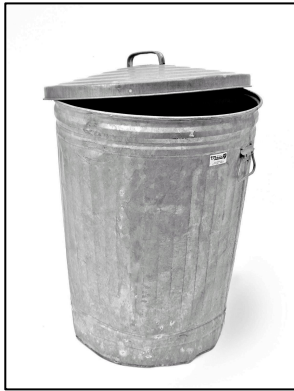
- Lab starts at 1:05pm
- Quiz (on lectures and labs)
 - M1D1, M1D5, M1D7...
- Hand in printed homework to front bench
- Prelab: interactive discussion~ 15-45 min
- Design and Experiment!
 - Keep notes in Electronic lab notebook (benchling)
 - Q&A throughout the afternoon

nothing goes from main lab to TC room

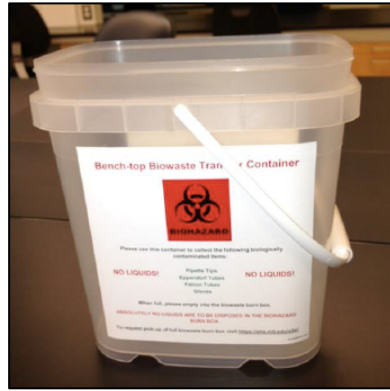
Personal protective equipment (PPE)

item	worn (BE guidelines)
<p>gloves</p> 	<ul style="list-style-type: none">- when working with chemical or biological materials➤ change when entering tissue culture room!
<p>lab coat</p> 	<ul style="list-style-type: none">- when working with chemical or biological materials➤ change when entering tissue culture room!
<p>goggles</p> 	<ul style="list-style-type: none">- when handling large quantities of powder or liquid due to chance of splash- when pipetting toxic chemicals (mutagens)- when using ethanol burners- in conjunction with face shield at UV transilluminator

Waste disposal refresher



regular trash can



benchtop waste



sharps container



liquid waste vacuum flask
-bacterial cultures
-bacterial media

no liquids!

-paper towels
-non bio waste

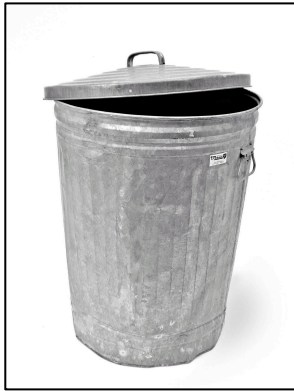
-plastic pipettes
-gloves
-plastic tubes
-pipette tips

-glass tubes
-glass pipettes
-razors
-needles&syringes

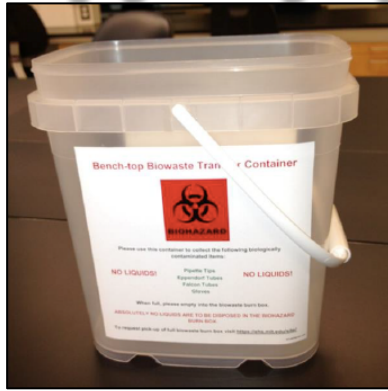
Waste disposal refresher

empty everyday

throw away
when full



regular trash can
facilities



benchtop waste



sharps container



liquid waste vacuum flask
instructors only



biowaste box

Today

- Find partner and bench / team color
 - record choice at front bench
- Complete lab orientation
 - [http://engineerbiology.org/wiki/20.109\(F17\):Lab_tour](http://engineerbiology.org/wiki/20.109(F17):Lab_tour)
 - no lab notebook entries required today

For Tuesday

- Respond to poll on best office hours times (emailed later today)
- Find homework ([http://engineerbiology.org/wiki/20.109\(F17\):Homework](http://engineerbiology.org/wiki/20.109(F17):Homework)):
 - Lab notebook in Benchling
 - Be ready for orientation quiz
 - print EHS training certificate
 - read Mod1 overview page

