

Welcome to 20.109(Sp17) !

Laboratory fundamentals of biological engineering

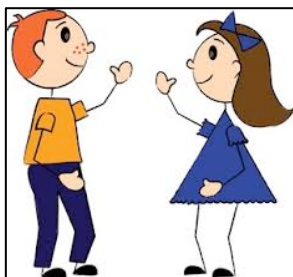
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Outline



- EHS training
- Let's get to know each other
- What will 20.109 teach you?
- How will the semester unfold?
- How will each lab day unfold?
- Lab tour: your first protocol!
- ... and on to 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

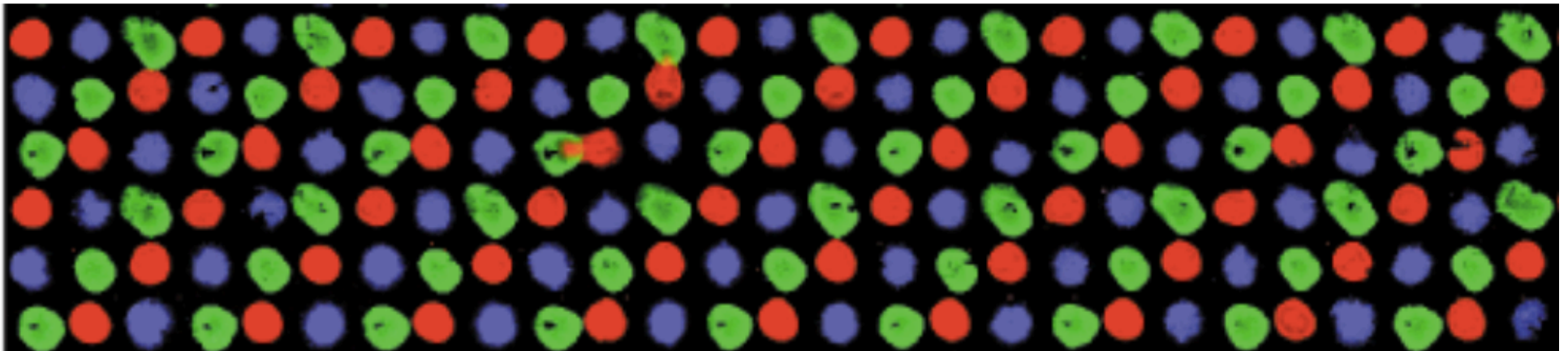


- **Collaboration**
 - work in pairs
 - some assignments are individually completed
 - class-wide collaboration (for data acquisition and analysis)
 - punctuality
 - integrity (*personal* reflections)
 - We faculty love being there for you: **turn to us with questions!**

The wiki is your best friend

[http://engineerbiology.org/wiki/20.109\(S17\)](http://engineerbiology.org/wiki/20.109(S17))

20.109(S17): Laboratory Fundamentals of Biological Engineering



Schedule Spring 2017 Announcements Assignments Homework Communication
1. High-throughput ligand screening 2. Gene expression modulating 3. Biomaterials engineering

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

In particular, check assiduously these tabs

- Schedule
- Assignments
- Homework

MODULE	DAY	DATE	LECTURER	LABORATORY EXPERIMENTS	ASSIGNMENTS
		T/W Feb 7/8	NLL 🔗	Orientation	
1	1	R/F Feb 9/10	AK 🔗	In silico cloning and induce protein expression	Orientation quiz Homework due
1	2	T/W Feb 14/15	AK 🔗	Purify induced protein	Homework due
1	3	R/F Feb 16/17	AK 🔗	Evaluate purity and concentration of protein	Laboratory quiz Homework due
		T/W Feb 21/22		President's day holiday	
1	4	R/F Feb 23/24	AK 🔗	Screen ligand library for FKBP12 binders	Homework due
1	5	T/W Feb/Mar 28/1	SD 🔗	Scan slides to identify FKBP12 binders	Laboratory quiz Homework due

20.109 assignments

Module	Assignment	% final grade	Due date
1	Data summary	15	03/13 (draft) and 03/27
1	Mini-presentation	5	03/18
2	Journal club presentation	15	03/23 or 04/11
2	Research article	20	04/22
3	Research proposal presentation	20	05/11
3	Mini-report	5	05/16
all	Lab notebook	5	1 day per module
all	Homework	10	Almost daily
all	Participation and blog	5	Before last day of module
all	Quizzes	extra credit	2-3 per module

individual : 60%

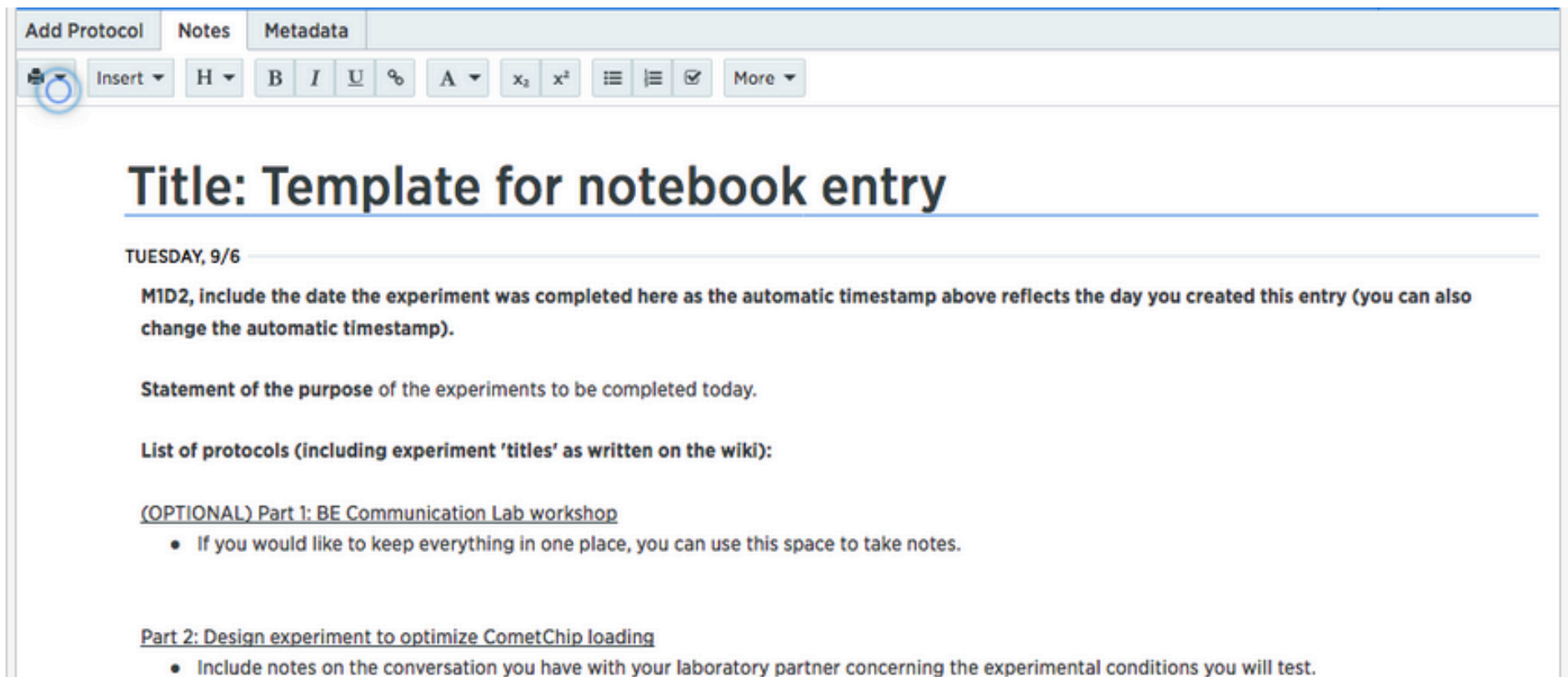
team: 40%

Homework

- Only 10% of final grade?!
- Give it your best:
 - never gratuitous, building blocks toward big-point assignment
 - a lot of feedback will prove very 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(F16)_YourName”
- Share with Rob, Leslie & Maxine: rwilson@mit.edu, lesliemm@, jonas_m@



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 "Insert", "H" (Heading), "B" (Bold), "I" (Italic), "U" (Underline), "A" (Text Color), "x₂" (Text Size), "x²" (Text Size), "List" (Bulleted List), "List" (Numbered List), "Check" (Checklist), and "More".

The main content area features a large heading: **Title: Template for notebook entry**, which is underlined. Below the heading is a horizontal line, and then the date "TUESDAY, 9/6".

The body of the notebook contains several sections:

- MID2, 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



- Quiz (on lectures and labs) 5 min
 - M1D1, M1D3, M1D5, M1D7, ...

- Hand in printed homework

- Prelab interactive presentation ~ 15-45 min




- Lab

- Electronic lab notebook entries

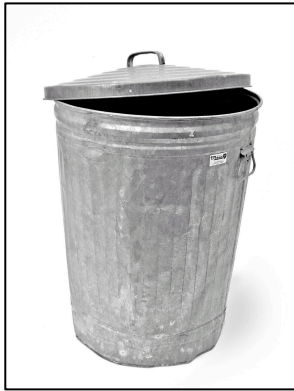
- Q&A all afternoon long



Personal protective equipment (PPE)

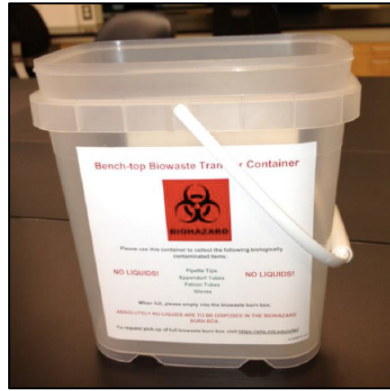
item	worn (BE guidelines)
gloves 	almost always <ul style="list-style-type: none">- when working with chemical or biological materials➤ change when entering tissue culture room!
lab coat 	almost always <ul style="list-style-type: none">- when working with chemical or biological materials➤ change when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

Waste disposal refresher



regular trash can

- paper towel
- non bio waste



benchtop waste

- pipette tips
- gloves
- microcentrifuge tubes
- falcon tubes
- plastic pipettes (5ml...)



sharps container

- razors
- needles, syringe
- glass tubes, pipettes

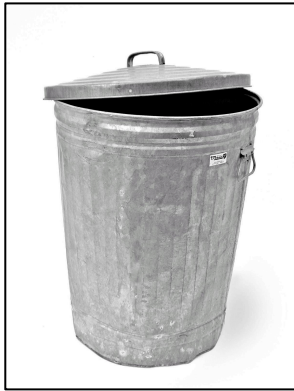


liquid waste vacuum flask

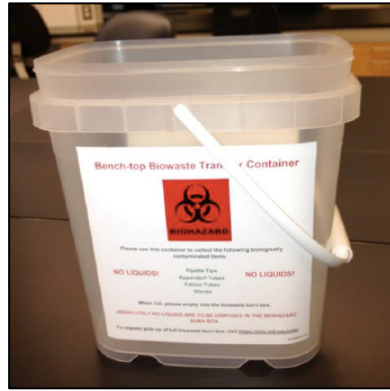
- media from bacterial cultures

no liquids!

Waste disposal refresher



regular trash can



benchtop waste



sharps container



liquid waste vacuum flask



biowaste box

Today

- Find partner and bench / team color
- Orientation (no need for lab notebook)
 - [http://engineerbiology.org/wiki/20.109\(S17\)Lab_tour](http://engineerbiology.org/wiki/20.109(S17)Lab_tour)



For Friday

- Respond to poll on best office hours times (from Maxine)
- Find homework:
 - [http://engineerbiology.org/wiki/20.109\(S17\):Homework](http://engineerbiology.org/wiki/20.109(S17):Homework)
 - Lab notebook in Benchling
 - Be ready for orientation quiz
 - EHS training