

Welcome to 20.109(Sp17) !

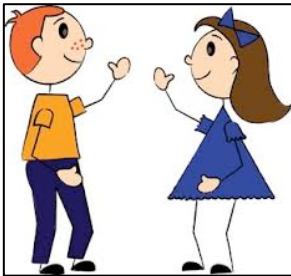
Laboratory fundamentals of biological engineering

02/07/2017

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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

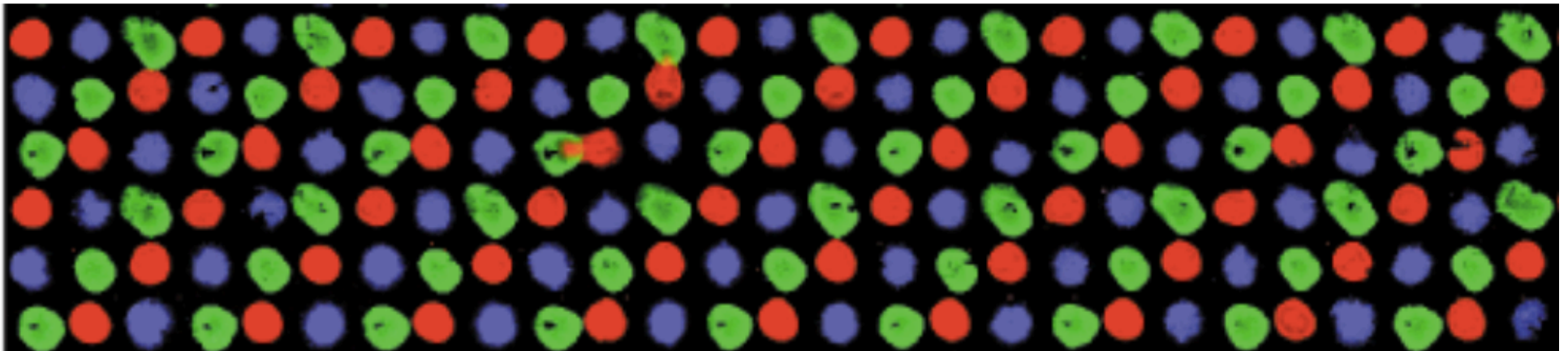


- **Collaboration**
 - work in pairs
 - some assignments are individually completed
 - class-wide collaboration (for data acquisition and analysis)
 - punctuality
 - integrity (*personal* reflections)
 - We faculty love being there for you: **turn to us with questions!**

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 prelab slides posted	
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%

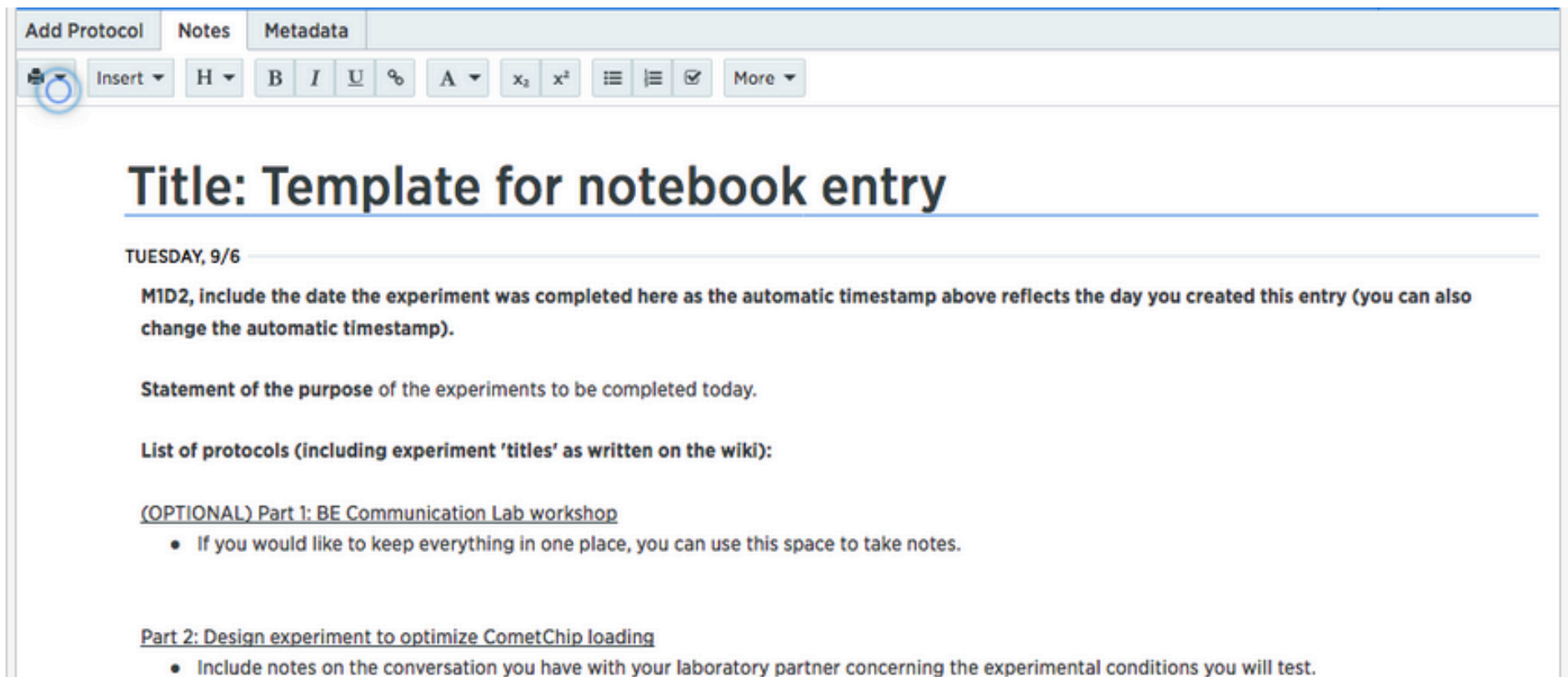
team: 40%

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(S17)_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" (Subscript), "x²" (Superscript), bulleted and numbered list, and "More" options. The main content area features a large heading "Title: Template for notebook entry" underlined. Below the heading is a date field "TUESDAY, 9/6". The body of the notebook contains several sections: a paragraph starting with "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).", a section for "Statement of the purpose of the experiments to be completed today.", a section for "List of protocols (including experiment 'titles' as written on the wiki):", and two optional parts: "Part 1: BE Communication Lab workshop" with a bullet point about using the space for notes, and "Part 2: Design experiment to optimize CometChip loading" with a bullet point about including notes on conversations with laboratory partners.

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

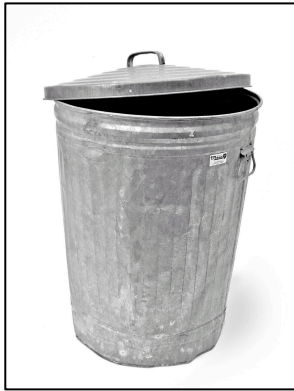
- Q&A all afternoon long



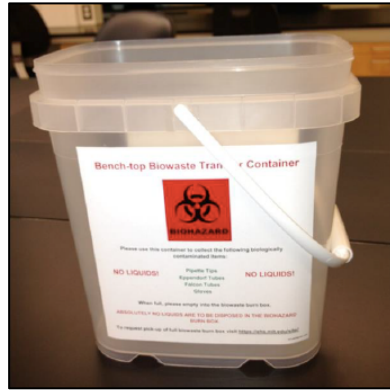
Personal protective equipment (PPE)

item	worn (BE guidelines)
gloves 	<ul style="list-style-type: none">- when working with chemical or biological materials➤ change when entering tissue culture room!
lab coat 	<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



benchtop waste



sharps container



liquid waste vacuum flask

no liquids!

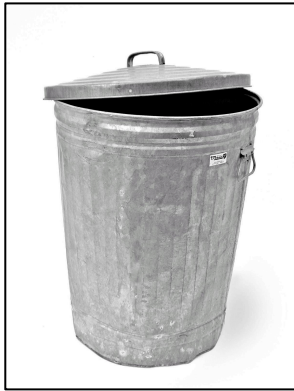
paper towels
(uncontaminated)

gloves
pipet tips
empty eppendorf tubes
plastic pipets
Kimwipes

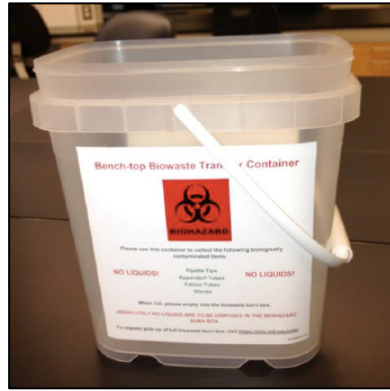
glass tubes
razors
glass slides
needles

10% bleach
20 min

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 Thursday

- Respond to poll on best office hours times
- 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