

Welcome to 20.109(Fa16) !

Laboratory fundamentals of biological engineering

09/09/2016

Maxine Jonas

jonas_m@mit.edu 16-239



Outline



- EHS training [by Damon Baptista](#)
- 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

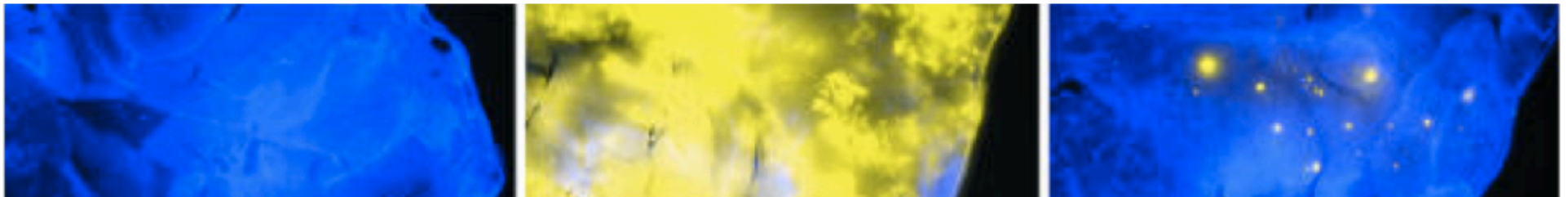


- **Collaboration**
 - work in pairs
 - some assignments are individually completed
 - class-wide collaboration (for data acquisition and analysis)
 - punctuality
 - integrity (*personal* reflections)
 - We faculty love being there for you: **turn to us with questions!**

The wiki is your best friend

[http://engineerbiology.org/wiki/20.109\(F16\)](http://engineerbiology.org/wiki/20.109(F16))

20.109(F16): Laboratory Fundamentals of Biological Engineering











Schedule Fall 2016 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 assiduously these tabs

- Schedule
- Assignments
- Homework

1	1	T/W Sept 13/14	BE 	Prepare microwell array and practice tissue culture	Lab orientation quiz Homework due
1	2	R/F Sept 15/16	BE 	Develop experiment to test loading variables and quantify growth rate	Homework due
1	3	T/W Sept 20/21	BE 	Test role of biochemical factors in genomic stability	Lab quiz Homework due
		R/F Sept 22/23	BE 	Lecture, but no laboratory Career fair student holiday	
1	4	T/W Sept 27/28	NLL 	Query inter-individual variability in exposure susceptibility	Lab quiz Homework due
1	5	R/F Sept 29/30	BE 	Develop approach for sub-nuclear visualization of DNA damage	Homework due
1	6	T/W Oct 4/5	BE 	Query DNA repair capacity in tumor cells	Lab quiz Homework due
1	7	R/F Oct 6/7	BE 	Analysis of sub-nuclear foci	Homework due
		T/W Oct 11/12		Columbus day holiday	Data Summary draft due Wed, Oct 12 at 5 pm

20.109 assignments

Module	Assignment	% final grade	Due date
1	Data summary	15	10/12 (draft) and 10/24
1	Mini-presentation	10	10/15
2	Journal club presentation	10	10/25-26 or 11/01-02
2	Research article	20	11/17
3	Research proposal presentation	20	12/08-09
3	Mini-report	5	12/12
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	2-4 per module

individual : 60%

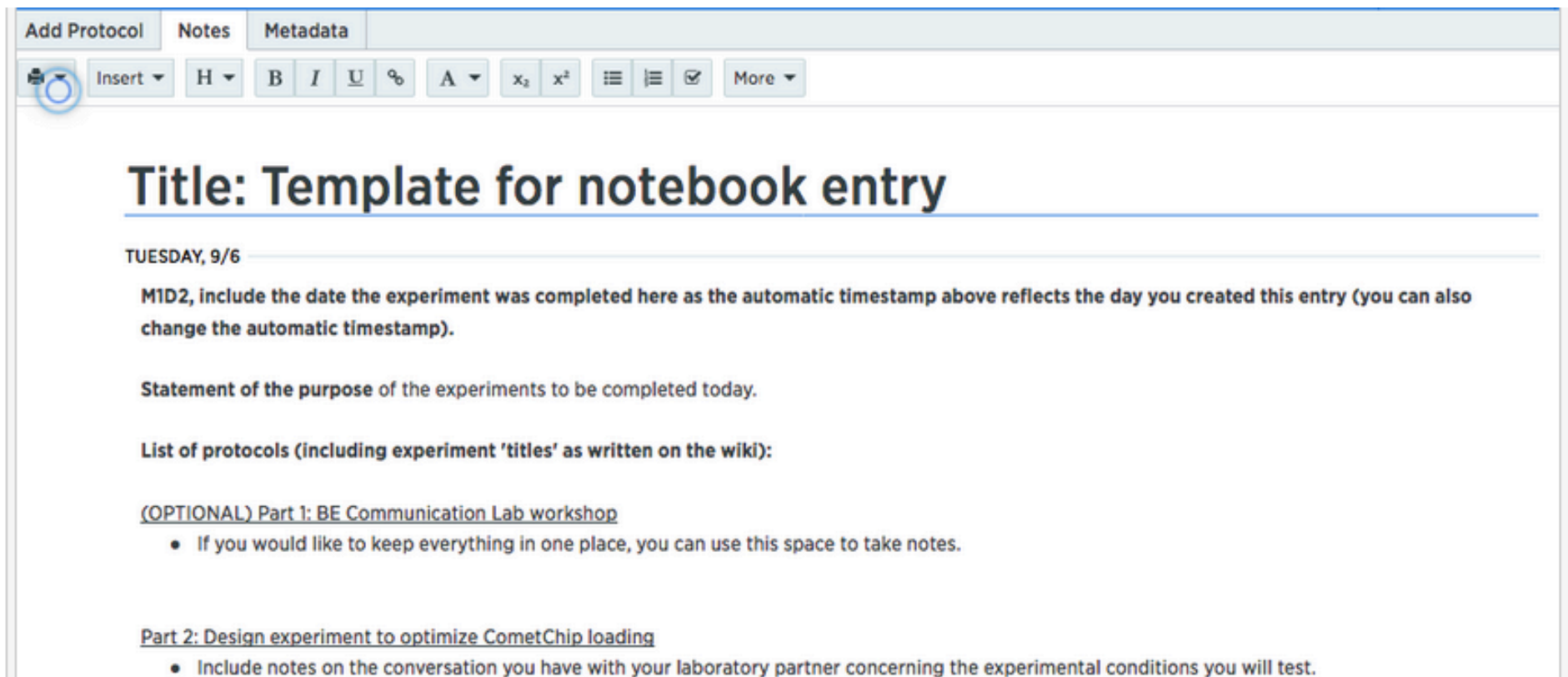
team: 40%

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 Emily, Leslie & Maxine: eclark@mit.edu, lesliemm@mit.edu, jonas_m@mit.edu
[maxine.jonas](mailto:maxine.jonas@mit.edu)



The screenshot shows a web interface for a Benchling notebook entry. 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, bold, italic, underline, link, text color, subscript, superscript, bulleted list, numbered list, and a 'More' dropdown. The main content area has a title 'Title: Template for notebook entry' followed by a horizontal line. Below the line is the date 'TUESDAY, 9/6'. The body of the notebook contains several sections: a paragraph about including the date, a section for the 'Statement of the purpose', a section for the 'List of protocols', and two optional parts: 'Part 1: BE Communication Lab workshop' and 'Part 2: Design experiment to optimize CometChip loading', each with a bulleted list of instructions.

Add Protocol Notes Metadata

Insert H B I U A x₂ x² More

Title: Template for notebook entry

TUESDAY, 9/6

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, M1D4, M1D6, ...

- Hand in printed homework

- Prelab interactive presentation ~ 15-45 min




- Lab

- Electronic lab notebook entries

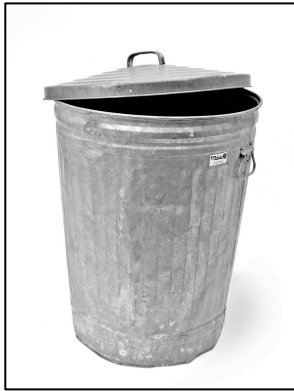
- Q&A all afternoon long



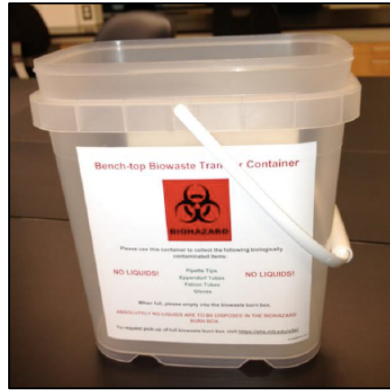
Personal protective equipment (PPE)

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



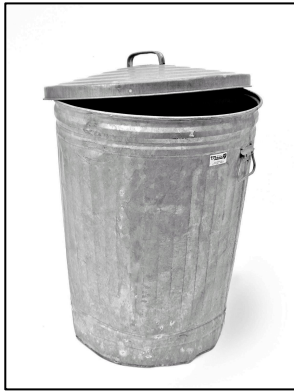
liquid waste vacuum flask

no liquids!

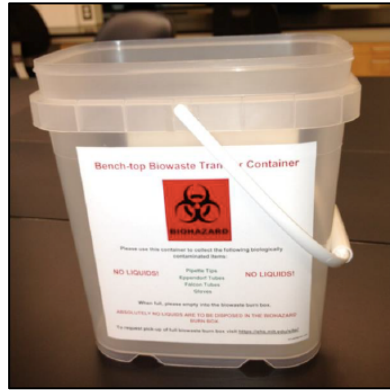
gloves
pipet tips
tubes
Kimwipes
plastic pipets

glass slides
needles
Pasteur pipets
glass tubes
razor blades

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\(F16\)Lab_tour](http://engineerbiology.org/wiki/20.109(F16)Lab_tour)



Check out your team drawer

For Wednesday

- Respond to poll on best office hours times
- Find homework:
 - [http://engineerbiology.org/wiki/20.109\(F16\):Homework](http://engineerbiology.org/wiki/20.109(F16):Homework)
 - Lab notebook in Benchling
 - Be ready for orientation quiz
 - EHS training