

Orientation:

WELCOME to 20.109!!



2/6/18

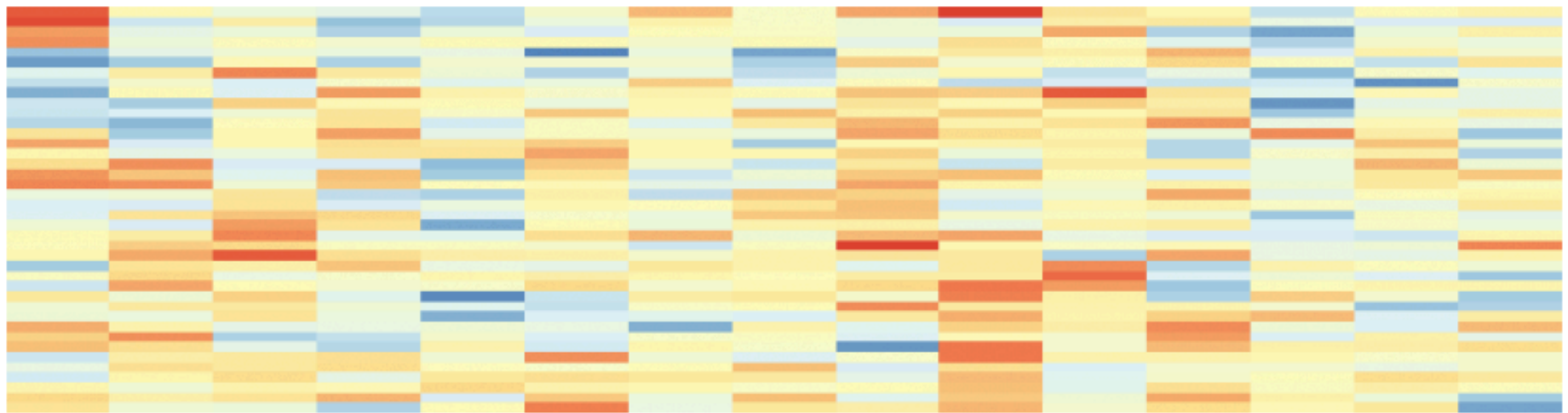
1. EHS laboratory-specific training
2. Introductions
3. Laboratory logistics
4. Orientation exercise – your first protocol!
5. Preparations for M1D1

Core mission of 20.109

- Collect **authentic** data
 - elements of design, unknown outcomes
- Practice **communicating** your science
 - written & oral, in homework and assignments, a lot of feedback
- Working in **collaboration** with colleagues
 - experiments completed in teams
 - assignments are completed individually or in teams (as noted)
 - class-wide collaboration (for data acquisition and analysis)
 - punctuality
 - integrity (*personal* reflections)
- The faculty are here to help – **come to us with questions!**

Say hello to our wiki!

20.109(S18): Laboratory Fundamentals of Biological Engineering



Spring 2018 schedule

FYI

Assignments

Homework

Class data

Communication

1. Assessing ligand binding

2. Measuring gene expression

3. Engineering biomaterials

[http://engineerbiology.org/wiki/20.109\(S18\):_Spring_2018_schedule](http://engineerbiology.org/wiki/20.109(S18):_Spring_2018_schedule)

The Schedule page is your best friend

MODULE	DAY	DATE	LECTURER	LABORATORY EXPERIMENTS	ASSIGNMENTS
		T/W Feb 6/7	NLL ↗	Orientation and laboratory tour	
1	1	R/F Feb 8/9	AK ↗	In silico cloning and confirmation digest of protein expression vector	Orientation quiz Homework due
1	2	T/W Feb 13/14	AK ↗	Complete small microarray analysis and induce protein expression	Homework due
1	3	R/F Feb 15/16	AK ↗	Purify protein for secondary assays	Homework due
		T/W Feb 20/21		President's day holiday	
1	4	R/F Feb 22/23	AK ↗	Evaluate protein purity and concentration	Laboratory quiz Homework due
1	5	T/W Feb 27/28	AK ↗	Test protein activity using peptidyl-prolyl cis-trans isomerase assay	Homework due
1	6	R/F Mar 1/2	AK ↗	Confirm ligand binding using differential scanning fluorimetry assay	Homework due
1	7	T/W Mar 6/7	AK ↗	Complete data analysis	Laboratory quiz Homework due
2	1	R/F Mar 8/9	NLL ↗	Practice tissue culture techniques and prepare cells for RNA purification	Homework due

Keep track of due dates

Module	Assignment	Weight	Due date
1	Data summary	15	3/12 (draft) and 3/26 (revision)
1	Mini-presentation	5	3/17
2	Journal club presentation	15	3/3 or 3/5
2	Research article	20	4/21
3	Research proposal presentation	20	5/10
3	Mini-report	5	5/14
all	Homework and Lab notebook	10	daily
all	Participation and blog	5	after last day of module
all	Quizzes	5	in class

individual : 60%

team: 40%

Homework builds to major assignments

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

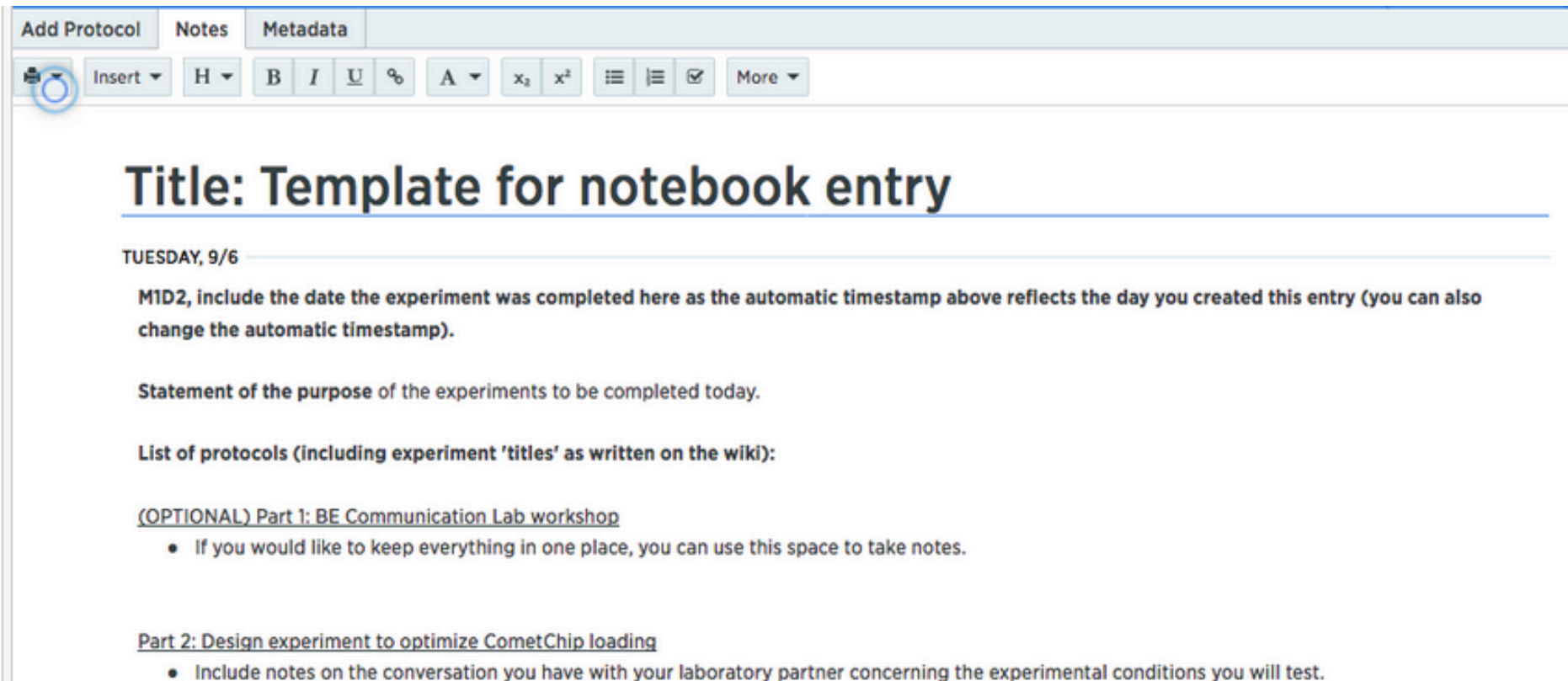


A laboratory day in the life of a 109er

- Lab starts at 1:05pm
- Quiz (on lecture and laboratory material)
 - M1D1, M1D4, M1D7...
- Submit printed homework assignment to front bench
- Participate in interactive prelab discussion
 - Typically ~15-45 min with focus on experimental details
- Design and Experiment!
 - Record notes in electronic laboratory notebook (Benchling)
 - Q&A throughout the afternoon

Record your science in Benchling

- Set up your account: benchling.com
- Title your project: “20.109(S18)_YourName”
- Share with Noreen & Casper: nlyell@mit.edu & enghuus@mit.edu



The screenshot shows the Benchling interface for creating a notebook entry. At the top, there are tabs for 'Add Protocol', 'Notes', and 'Metadata'. Below these is a rich text editor toolbar with options for 'Insert', 'H' (Heading), 'B' (Bold), 'I' (Italic), 'U' (Underline), 'A' (Text color), 'x₂' (Subscript), 'x²' (Superscript), bulleted and numbered list icons, a checkmark icon, and a 'More' dropdown menu. The main content area displays a template for a notebook entry with the following structure:

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.

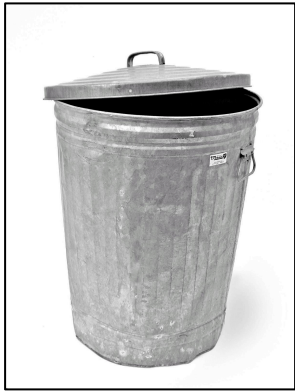
Part 2: Design experiment to optimize CometChip loading

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

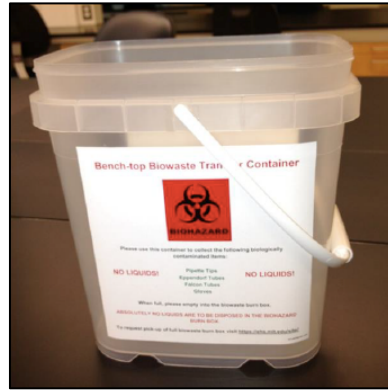
We do our science safely

PPE item	When to wear?
<p data-bbox="112 435 247 472">Gloves</p> 	<ul data-bbox="571 521 1642 621" style="list-style-type: none">- when working with chemical or biological materials➤ change when entering tissue culture room!
<p data-bbox="112 736 282 773">Lab coat</p> 	<ul data-bbox="571 822 1642 922" style="list-style-type: none">- when working with chemical or biological materials➤ change when entering tissue culture room!
<p data-bbox="112 1038 272 1075">Goggles</p> 	<ul data-bbox="571 1038 1767 1308" 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

Be sure to dispose of waste correctly



trash can



benchtop waste



sharps jar



aspirator

NO LIQUIDS!!!

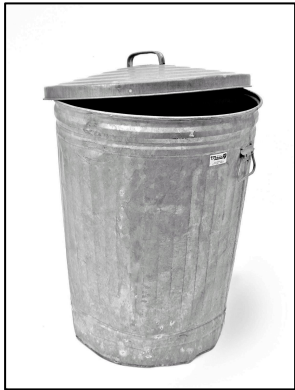
paper towels

gloves
pipet tips
tubes
contaminated
paper towels

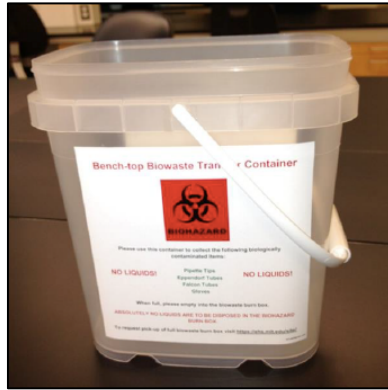
razors
broken glass
glass tubes
needles

media / culture waste

Everyone has waste responsibilities



trash can



benchtow waste



sharps jar



aspirator



Lab business...

- For today:
 - Make a friend, choose a bench, sign-up on the lab map up front!
 - Complete laboratory orientation exercise
 - Orientation quiz on M1D1
- For M1D1:
 - Read through Homework assignments
 - See 'Homework' tab on wiki
 - Watch for email concerning Office Hours poll