

Welcome to 20.109!

Laboratory Fundamentals of Biological Engineering

February 7, 2018

Plan for today

1. EHS training
2. Get to know one another
3. Laboratory specifics
4. Orientation exercise – your first protocol!
5. Preparations for M1D1



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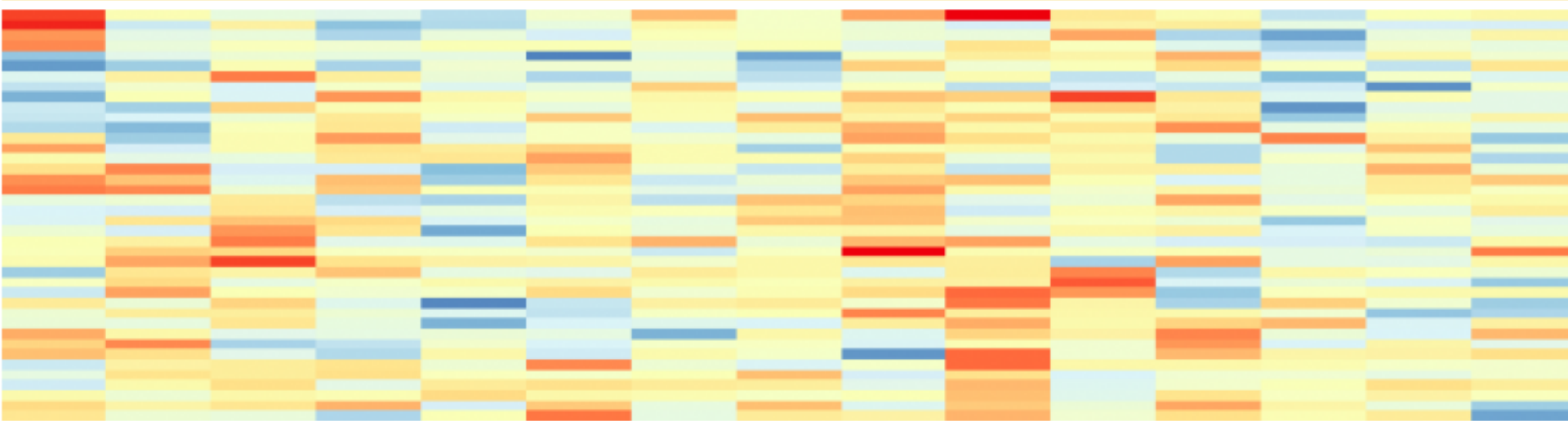
Core missions of 20.109

- 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!**

The wiki is your best friend

[http://engineerbiology.org/wiki/20.109\(S18\): Spring 2018 schedule](http://engineerbiology.org/wiki/20.109(S18):_Spring_2018_schedule)

20.109(S18): Laboratory Fundamentals of Biological Engineering



Spring 2018 schedule

1. Assessing ligand binding

FYI

Assignments

2. Measuring gene expression









Homework

Class data

3. Engineering biomaterials

Communication

Bookmark the Schedule page

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

Keep track of assignment due dates

(See Assignments tab on wiki)

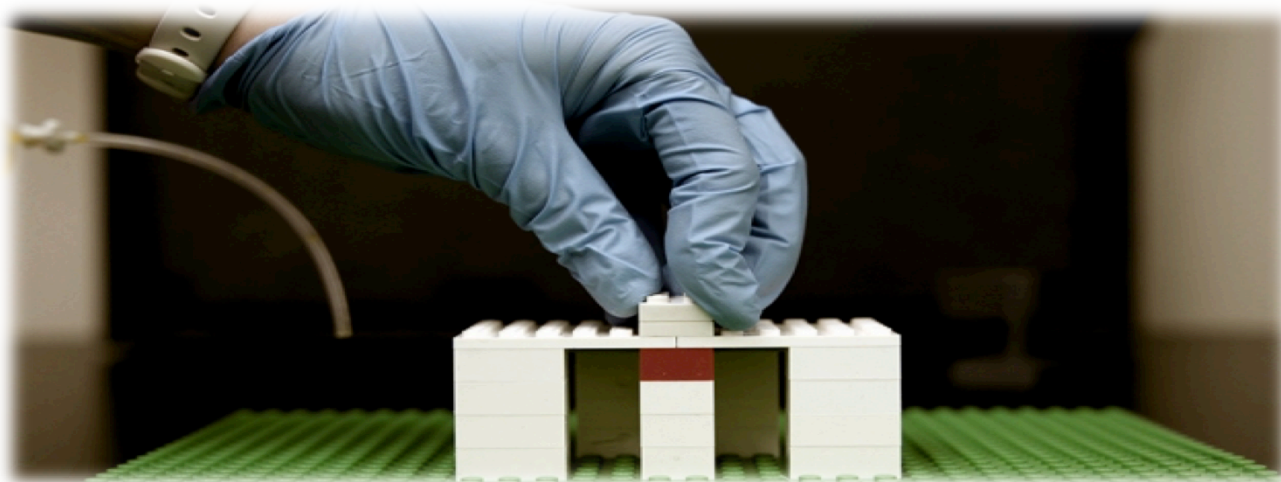
Module	Assignment	% final grade	Due date
1	Data summary	15	3/12 (draft), 3/26 (revision)
1	Mini-presentation	5	3/17
2	Journal club presentation	15	4/4, 4/6
2	Research article	20	4/21
3	Research proposal presentation	20	5/11
3	Mini-report	5	5/14
all	Homework and Lab notebook	10	daily
all	Participation and blog	5	after module, see wiki
all	Quizzes	5	2 per module

individual : 60%

team: 40%

Homework builds to 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



Owens and Hart,
Lab on a LEGO
Image by
Melanie Gonick,
MIT News

A typical day in 20.109

- Lab starts at 1:05pm
- Quiz (on lectures and labs)
 - M1D1, M1D4, M1D7...keep track on wiki!
- 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






Lab notebook in Benchling

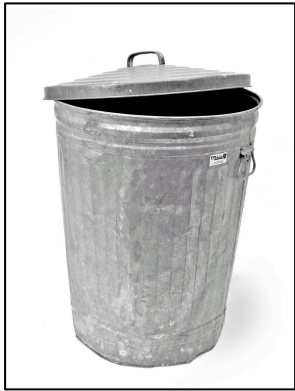
- Set up an account: benchling.com
- Entitle your project “20.109(S18)_YourName”
 - Make each module a new folder
 - Make each day a new entry within appropriate folder
- Share with Josephine & Casper: joshaw@mit.edu, enghuus@mit.edu

The screenshot displays the Benchling web interface. On the left, a blue sidebar contains navigation icons for home, projects, inventory, and search. The main area shows a project titled "20.109(Fa17)_JosephineBa" with a "NOTEBOOK" tab selected. A dropdown menu is open over the "NOTEBOOK" tab, listing options: "Folder", "Entry", "Entry from template", "Protocol", and "Import from Evernote". The "M1D1" entry is selected, showing a date of "1/16/2018". The right side of the interface shows the "M1D1" entry editor with tabs for "ADD PROTOCOL", "NOTES", and "METADATA". The "NOTES" tab is active, displaying a rich text editor with a toolbar containing icons for bold, italic, underline, strikethrough, link, unlink, text color, background color, subscript, and superscript. The main content area shows the title "M1D1" and the date "TUESDAY, 1/16" with a text input field labeled "Enter text here".

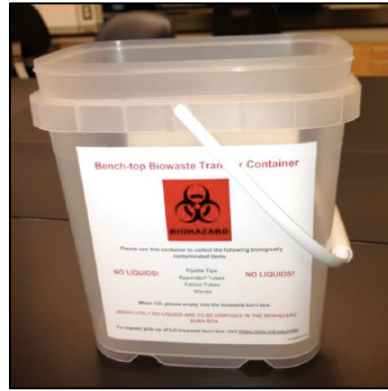
Personal protective equipment (PPE)

Item	Worn (BE guidelines)
<p data-bbox="112 411 247 448">Gloves</p> 	<ul data-bbox="571 496 1649 594" style="list-style-type: none">- When working with chemical or biological materials➤ Change when entering tissue culture room!
<p data-bbox="112 711 282 748">Lab coat</p> 	<ul data-bbox="571 796 1649 893" style="list-style-type: none">- When working with chemical or biological materials➤ Change when entering tissue culture room!
<p data-bbox="112 1011 272 1048">Goggles</p> 	<ul data-bbox="571 1011 1773 1279" 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



regular trash can



benchtop waste



sharps container



liquid waste vacuum flask

NO LIQUIDS!

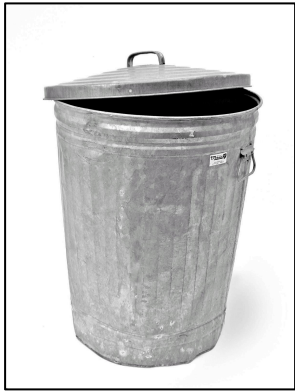
paper towels
non-biowaste
non-chemical

gloves
pipet tips
plastic tubes

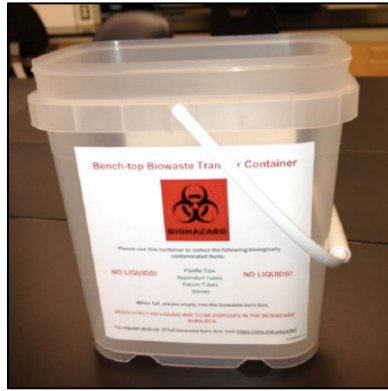
needles
glass
razor blades

media/culture
waste

Everyone has waste responsibilities



regular trash can



benchtop waste



sharps container



liquid waste vacuum flask

Please empty
benchtop
waste daily



biowaste box

Today

- Find partner and bench / team color
 - Record choice at front bench
- Complete lab orientation
 - [http://engineerbiology.org/wiki/20.109\(S18\):Laboratory_tour](http://engineerbiology.org/wiki/20.109(S18):Laboratory_tour)
 - No lab notebook entries required today

For Friday

- Respond to poll on best office hours times (emailed later today)
- Find homework ([http://engineerbiology.org/wiki/20.109\(S18\):Homework](http://engineerbiology.org/wiki/20.109(S18):Homework)):
 - Lab notebook in Benchling
 - Be ready for orientation quiz
 - Print EHS training certificate(s)
 - Read Mod1 overview page and M1D1 introduction

Friendships can end.
Girlfriends/boyfriends can end.
Only **lab partner** has no **end**.

