

Welcome to 20.109(Fa16) !

Laboratory fundamentals of biological engineering

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MOD0: Lab Orientation

1. Let's get to know each other
2. 20.109 Mission
3. Intro to the Wiki, semester overview
4. Intro to Benchling
5. Lab basics and your first protocol

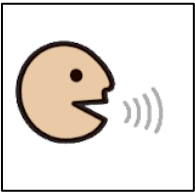
The pillars of 20.109

- **Authentic science**



- elements of design
- unknown outcomes

- Focus on **communicating** your science



- written & oral, in homework and assignments

- **Integrity-based Collaboration**

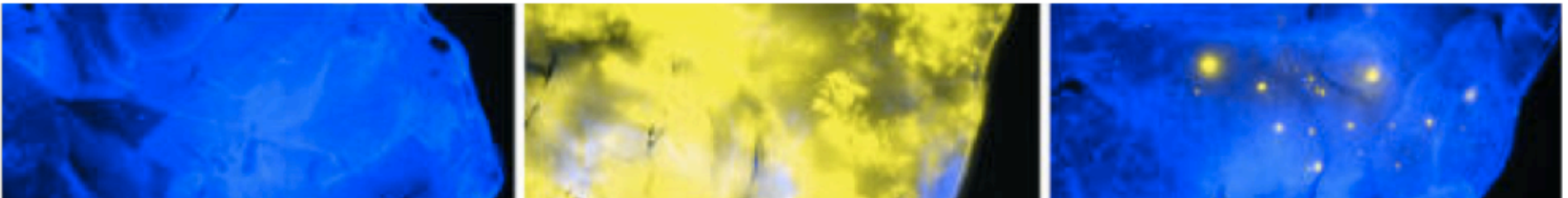


- work in pairs, teams
- major assignments are both team efforts and individually completed
- class-wide collaboration (for data acquisition and analysis)
- punctuality (lab starts at 1:05pm)
- We faculty love being there for you: **turn to us with questions!**

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

****Bookmark me****

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	
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		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

Dates are updated!

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%

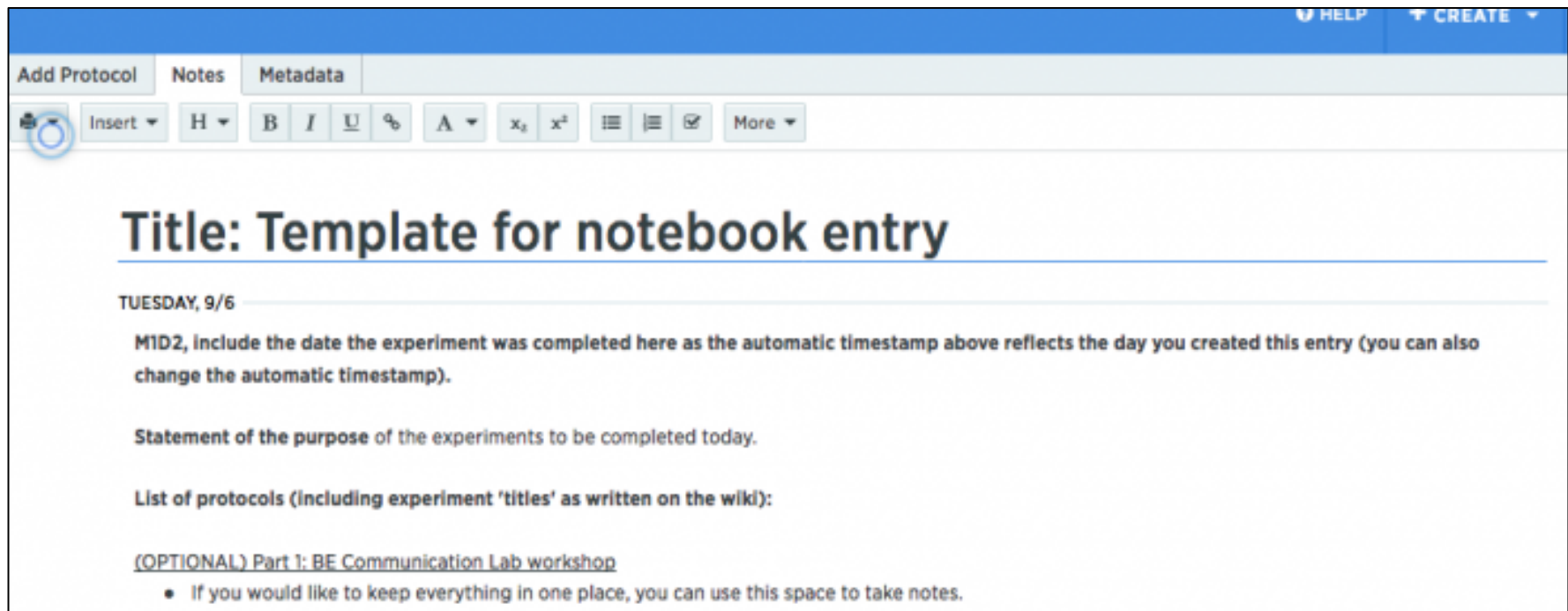
team: 40%

Homework

- All homework assignments build toward major assignments
- Only 10% of final grade (?!)
- Give it your best:
 - never gratuitous
 - we provide 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
- You should read through the lab notebook guidelines under the communication tab on the wiki



The screenshot displays the Benchling interface for creating a lab 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, and a 'More' dropdown menu. The main content area features a large heading 'Title: Template for notebook entry' followed by a horizontal line. Below the line, the date 'TUESDAY, 9/6' is displayed. The template includes several sections: a note about the timestamp, a section for the 'Statement of the purpose of the experiments to be completed today.', a section for the 'List of protocols (including experiment 'titles' as written on the wiki):', and an '(OPTIONAL) Part 1: BE Communication Lab workshop' section with a bullet point: '• If you would like to keep everything in one place, you can use this space to take notes.'




A typical day in 20.109

- Quiz (material from lecture and lab) 5 min
 - M1D1, M1D3, M1D4, M1D6, ...
- Hand in printed homework, receive graded homework
- Prelab discussion~ 15-45 min
- SCIENCE!
- Electronic lab notebook entries
- Q&A all afternoon long

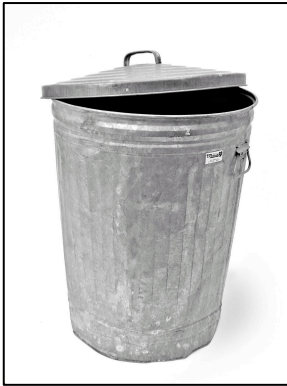


Personal protective equipment (PPE)

****Nothing goes from the main lab to the tissue culture space****

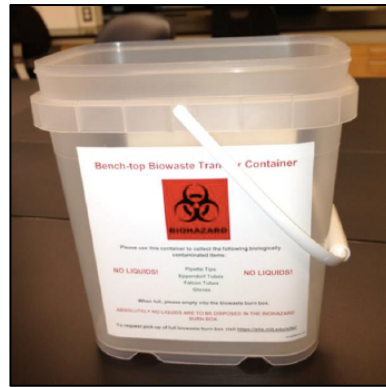
item	worn (BE guidelines)
<p>gloves</p> 	<p>almost always!</p> <ul style="list-style-type: none">- when working with chemical or biological materials➤ change when entering tissue culture room!
<p>lab coat</p> 	<p>almost always!</p> <ul style="list-style-type: none">- when working with chemical or biological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



regular trash can

- non biological waste
- paper towels



benchtop waste

- GLOVES
- tips
- plastic tubes and pipettes



sharps container

- glass tubes
- glass pasteur pipettes



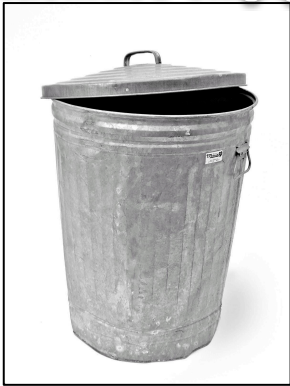
liquid waste vacuum flask

- no chemical waste!
- liquid biological waste to be bleached

no liquids!

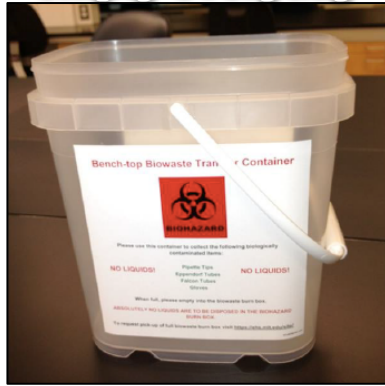
Waste disposal

facilities empty



regular trash can

empty everyday



benchtop waste

empty when full



sharps container

instructors will empty



liquid waste vacuum flask



biowaste box

Today

- Find partner and bench / team color
- Work through lab orientation (no need for lab notebook)
 - [http://engineerbiology.org/wiki/20.109\(F16\)Lab_tour](http://engineerbiology.org/wiki/20.109(F16)Lab_tour)

TUESDAY!

For ~~Wednesday~~

- Respond to poll on best office hours times (email)
- 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 lab orientation quiz
 - EHS training print-out