

Orientation and laboratory tour



to 20.109!!

1. Introductions
2. Prelab discussion
3. Orientation exercises
4. Preparations for M1D1

Let's get to know each other!

- Your name?
- Your research experience or interests?
- If you could go anywhere / see anything in the universe, where would you go / what would you see?



How can you reach us?

- Noreen Lyell
 - Email: nllyell@mit.edu
 - Becky Meyer
 - Email: rcmeyer@mit.edu
 - Jamie Zhan
 - Email: zhanj@mit.edu
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- Take advantage of class time!
 - Office hours TBD
 - One-one-one meetings scheduled by request



What will we do this semester?

- 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 20.109 team is here to help – **come to us with questions!**

The wiki is your new best friend

20.109(S23): Laboratory Fundamentals of Biological Engineering










Dark Green	Dark Green	Dark Green	Dark Green	Medium Green	Dark Green	Light Green	Dark Green	Dark Green	Dark Green	Dark Green	Medium Green	Dark Green
Dark Green	Medium Green	Medium Green	Light Green	Dark Green	Dark Green	Dark Green	Dark Green	Dark Green	Medium Green	Medium Green	Dark Green	Dark Green
Dark Green	Dark Green	Dark Green	Dark Green	Dark Green	Light Green	Medium Green	Dark Green	Dark Green	Medium Green	Light Green	Dark Green	

Spring 2023 schedule FYI Assignments Homework Class data Communication Accessibility [↗](#)

M1: Drug discovery M2: Protein engineering M3: Project design

[http://engineerbiology.org/wiki/20.109\(S23\):Spring_2023_schedule](http://engineerbiology.org/wiki/20.109(S23):Spring_2023_schedule)

”It’s on the wiki...”

MODULE	DATE	LECTURER	LABORATORY EXPERIMENTS	ASSIGNMENTS
	T/W Feb 7/8	NLL  Lecture slides	Orientation and laboratory tour	
M1D1	R/F Feb 9/10	AK 	Complete in-silico cloning of protein expression plasmid	Orientation quiz Homework due
M1D2	T/W Feb 14/15	AK 	Perform protein purification protocol	Homework due
M1D3	R/F Feb 16/17	AK 	Assess purity and concentration of purified protein	Homework due
	T/W Feb 21/22		President's Day holiday	
M1D4	R/F Feb 23/24	AK 	Confirm purified protein using Western blot	Laboratory quiz Homework due
M1D5	T/W Feb/Mar 28/1	AK 	Image Western blot of purified protein	Homework due
M1D6	R/F Mar 2/3	AK 	Prepare and scan small molecule microarray (SMM) slides	Homework due Research talk due Sat, Mar 4 at 10pm
M1D7	T/W Mar 7/8	AK 	Analyze SMM data to identify putative small molecule binders	Homework due
M1D8	R/F Mar 9/10	BE Comm Lab	Organize Data summary figures and results	Laboratory quiz Homework due
M2D1	T/W Mar 14/15	BCM 	Determine mutagenesis strategy	Homework due

Mark your calendars

Module	Assignment	% of final grade	Due date
1	Research talk	5	3/4
1	Data summary	15	draft 3/18, revision 3/27
2	Journal club presentation	15	4/4 – 4/7
2	Research article	20	5/1
3	Research proposal presentation	20	5/5 or 5/6
all	Homework	10	daily
all	Laboratory notebook	5	refer to wiki
all	Participation and blog	5	refer to wiki
all	Quizzes	5	refer to wiki

individual : ~65%

team: ~35%

Homework is the key to success

- Only 10% of final grade?!
- Give it your best:
 - Consider homework to be a first draft
 - Never gratuitous, building blocks for major assignments
 - LOTS of feedback is provided
 - Great tool to stay of track and pace your work
- Submit to Canvas by 1:05p on due date
 - **Name submission according to this format: YourName_Assignment (NoreenL_M1D1)**
 - Grades and comments will be returned via Stellar
- Generous late policy used in place of extensions
 - 1/3 of letter grade deduction per 24 hrs late (within 24 hr of due date = -0.3 / 10 pts)

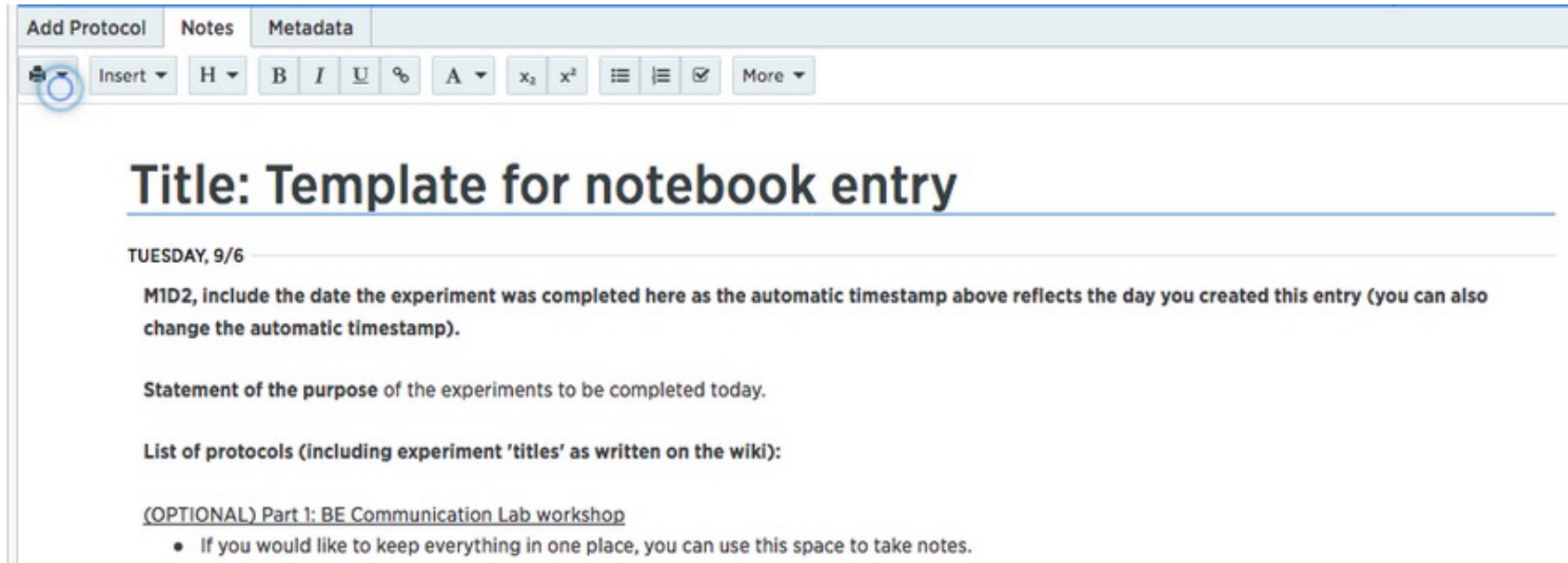


A typical laboratory day

- **Prelab discussion starts at 1:05pm**
 - Alert me in advance if you will be absent / late when possible
- **Submit homework to Canvas by 1:05pm**
- Participate in interactive prelab discussion
 - Typically 15-60 minutes with focus on experimental details
- Design and Analyze!
 - Keep notes in electronic laboratory notebook
 - Q & A throughout the afternoon
- Quiz (see dates on wiki!)
 - Questions from lecture and prelab material

How will you record your work?

- Set up your account: benchling.com
- Title your project “20.109(S23)_YourName”
 - Make each module a new folder
 - Make each day a new entry within the appropriate module folder
- Share with me (nilyell@mit.edu) and Jessica (jjsun2@mit.edu)






The screenshot shows a web interface for creating a notebook entry. At the top, there are tabs for 'Add Protocol', 'Notes', and 'Metadata'. Below the tabs is a rich text editor toolbar with icons for undo, insert, heading (H), bold (B), italic (I), underline (U), link, text color (A), subscript (x₂), superscript (x²), bulleted list, numbered list, and a 'More' dropdown menu. The main content area contains a title field with the text 'Title: Template for notebook entry' and a horizontal line below it. Below the title is a date field with the text 'TUESDAY, 9/6'. The body of the entry contains several sections: a paragraph starting with '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).', 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 an optional section for '(OPTIONAL) Part 1: BE Communication Lab workshop' which includes a bullet point: '• If you would like to keep everything in one place, you can use this space to take notes.'

Important class policies

- **Absences from lecture** will result in loss of participation points
 - You are responsible for getting lecture material even if you are absent
- **Laboratory attendance is mandatory**
 - Excused absences must be discussed with the Instructors as soon as possible
 - Unexcused absences = 1/3 of a letter grade deduction from the final grade on the major assignment for the module (for example, a B+ would become a B)
 - If possible, you should attend a different laboratory section to complete experiments
- **Late policy for homework and major assignments** is very generous!
 - In lieu of extensions
 - Each day late = -0.3 pts /10 or -3 pts /100
 - Work will not be accepted 1 week past the due date

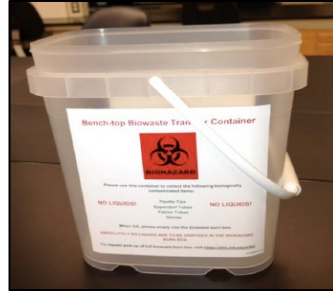
Remember your PPE!

Item	Worn (BE guidelines)
<p data-bbox="384 496 504 532">Gloves</p> 	<ul data-bbox="848 565 1842 665" style="list-style-type: none">- When working with chemical or biological materials➤ Change when entering tissue culture room!
<p data-bbox="384 758 529 793">Lab coat</p> 	<ul data-bbox="848 826 1842 926" style="list-style-type: none">- When working with chemical or biological materials➤ Change when entering tissue culture room!
<p data-bbox="384 1019 524 1055">Goggles</p> 	<ul data-bbox="848 1068 2204 1260" 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 correctly dispose of waste!



regular trash can



benchtop waste



sharps container



liquid waste vacuum flask

**Please empty
benchtop waste
after every lab!**



biowaste box

For today...

- Watch demonstration for Station 1 of laboratory tour
- Work through remaining Stations of laboratory tour with classmate
- Complete and submit laboratory partner questionnaire
 - Specific partner assignments can be requested
- [http://engineerbiology.org/wiki/20.109\(S23\):Spring_2023_schedule](http://engineerbiology.org/wiki/20.109(S23):Spring_2023_schedule)

For M1D1...

- Complete homework assignments described on wiki
- Study for Laboratory orientation quiz
- Prepare for M1D1!