to the 20.109 lab!

Orientation (M0D0):

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

Introductions

- What year are you at MIT?
- Do you have any research experience you want to share?
- Where in the universe would you go if you got the chance?

Where can you find the instructors?

- Noreen Lyell
  - Office: 16-317
  - Email: nllyell@mit.edu
- Becky Meyer
  - Office: 16-319
  - Email: rcmeyer@mit.edu
- Jamie Zhan
  - Office: 16-469
  - Email: zhanj@mit.edu

Office hours will be established

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)
  - Integrity (*personal* reflections)
- The faculty are here to help – **come to us with questions!**

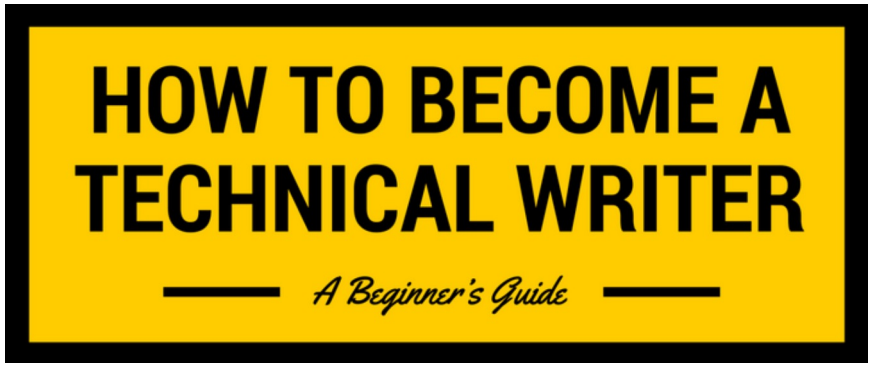
Key deadlines this semester

Assignment	% final grade	Due date
Data summary	15	10/12 (draft), 10/22 (revision)
Research talk	5	10/1
Journal club presentation	15	11/1 & 2 or 11/3 & 4
Research article	20	11/21
Research proposal presentation	20	12/8 or 12/9
Lab notebook	5	at the end of each module
Homework	10	daily
Participation	5	daily for notebooks, 4 blog posts
Quizzes	5	2 per module

individual : 65%

team: 35%

Homework helps!



- A chance to practice technical/ scientific writing
  - Technical writing is a very specific style
  - Requires conciseness, clarity, and precision

- Each piece of homework will become a component of a major assignments
  - Allows you to get individualized feedback on first draft of work

- Homework, collectively, is only worth 10% of your final grade
  - Not because it isn't important
  - Gives you a chance to make mistakes without serious damage to your grade

- Homework must be submitted by 1:05pm on the day of lab
  - Submit as .doc or .pdf to Canvas
  - Write your name in the text of the document
  - **Document name: Your name_assignment name/identifier**

Class policies to note (also on wiki!)

- **Absences from lecture** will impact participation points accumulated throughout the semester.
  - You are responsible for getting lecture material even if you are absent

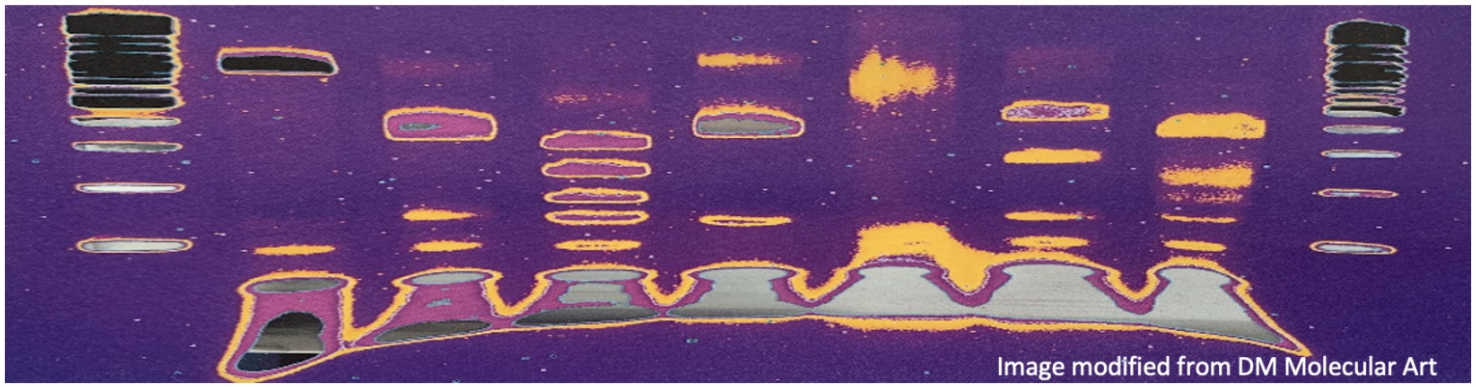
- **Laboratory attendance is mandatory**
  - Excused absences should be discussed with the Instructors as soon as possible.
  - Unexcused absences = 1/3 of a letter grade deduction from the final grade on the major assignment for the module (for example, a B+ would become a B).
    - If absent, you may be required to 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 for homework = -0.3pts /10
  - Each day late for major assignment = -3pts /100
  - Work will not be accepted 1 week past the due date

Welcome to the wiki! The wiki is your lifeline…

http://engineerbiology.org/wiki/20.109(F22):Fall_2022_schedule

20.109(F22): Laboratory Fundamentals of Biological Engineering



Fall 2022 schedule FYI Assignments Homework Class data Communication Accessibility

M1: Genomic instability M2: Drug discovery M3: Project design

Welcome to 20.109! It is our goal to make this class a useful and fun introduction to the experiments and techniques used in biological engineering. Though there is not enough time to show you everything needed to do research, after this class you will feel confident and familiar with some fundamental experimental approaches and laboratory protocols. You will develop good habits at the bench, which will increase the likelihood of success in your work and ensure the health and safety of you and your labmates. By the end of the semester, you will also be well-versed in good scientific practices - through your experience with scientific writing, notebook keeping, and orally presenting data and novel ideas. All of us involved in teaching 20.109 hope you will find it a satisfying challenge and an exciting experience that has lasting value.

SCHEDULE DETAILS:

Lecture times: Tuesday (T) and Thursday (R) 11 - 12 pm in 16-220

Laboratory section times: Tuesday (T) and Thursday (R) 1 - 5 pm or Wednesday (W) and Friday (F) 1 - 5 pm in 56-322

If the wiki is your lifeline, the Schedule page is your best friend

MODULE	DATE	LECTURER	LABORATORY EXPERIMENTS	ASSIGNMENTS
	R/F Sep 8/9	NLL	Orientation and laboratory tour	
M1D1	T/W Sep 13/14	BPE	Learn best practices for mammalian cell culture	**Orientation quiz** Homework due
M1D2	R/F Sep 15/16	BPE	Prepare and treat cells for γ-H2AX experiment	Homework due
M1D3	T/W Sep 20/21	BPE	Use immunoflourescence staining to assess γ-H2AX experiment	Homework due
	R/F Sep 22/23	BE Comm Lab	**Career Day holiday**	
M1D4	T/W Sep 27/28	BPE	Complete data analysis for γH2AX experiment	**Laboratory quiz** Homework due
M1D5	R/F Sep 29/30	BPE	Treat cells for CometChip assay	Homework due **Research talk due** Sat, Oct 1 at 10 pm
M1D6	T/W Oct 4/5	BPE	Image and analyze data for CometChip assay	Homework due
M1D7	R/F Oct 6/7	BPE	Examine experimental data using statistical methods	**Laboratory quiz** Homework due
	T/W Oct 11/12		**Indigenous Peoples' Day holiday**	**Data Summary draft due** Wed, Oct 12 at 10 pm [Blog post due] Thu, Oct 13 at 10 pm
M2D1	R/F Oct 13/14	JCN	Complete in-silico cloning of protein expression plasmid	Homework due

A laboratory day in the life of a 109er

- Lab starts at 1:05pm
  - **You must alert me in advance if you will be late or are sick**

- Quiz starts immediately at 1:05pm (on lectures and laboratory material)
  - M1D4, M1D7, M2D4, M2D7…as noted on the wiki!

- Submit homework to Canvas by 1:05pm

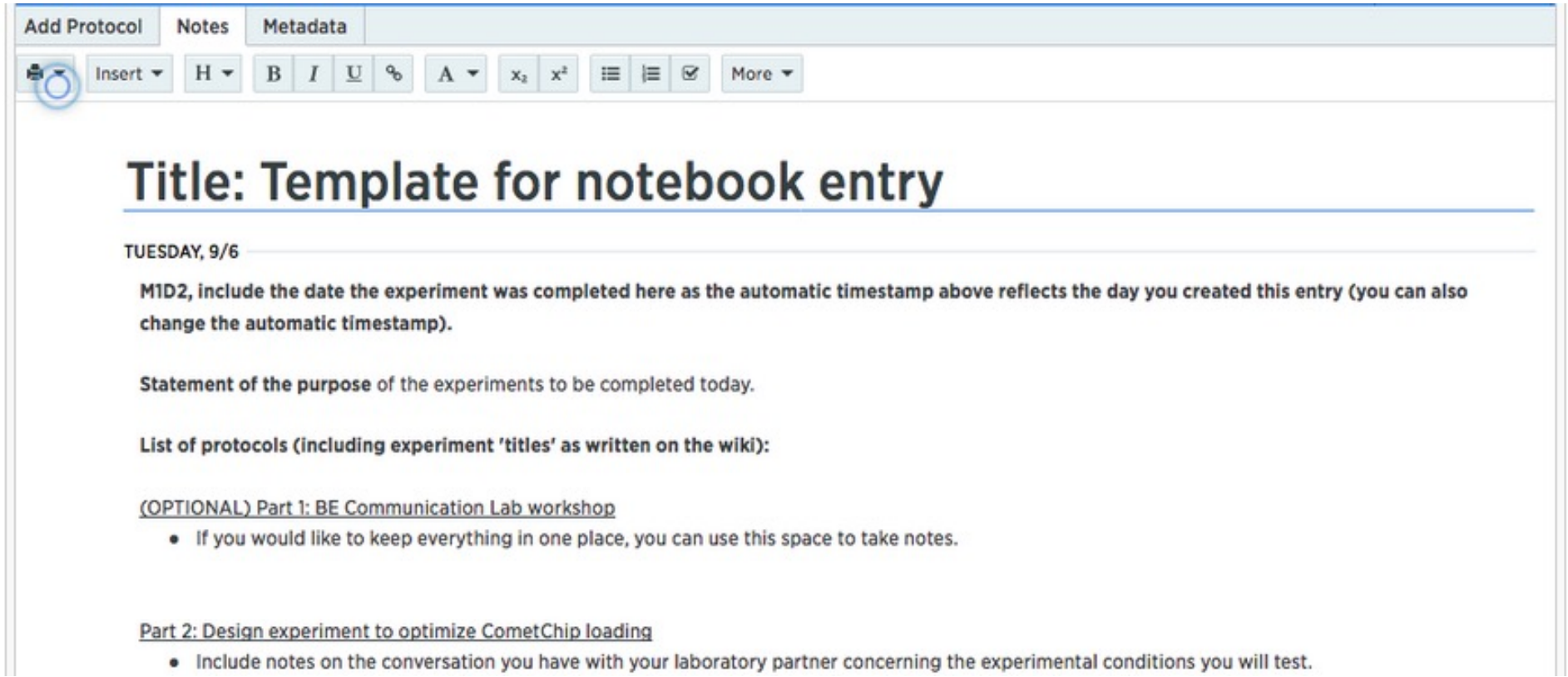
- Participate in interactive prelab discussion
  - Typically 15-45 minutes with focus on experimental details

- Design and Experiment!
  - Keep 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(F22)_YourName”
  - Make each module a new folder
  - Make each day a new entry within the appropriate module folder
- Share with your Instructor and TA

Becky (rcmeyer@mit.edu) and Chyna (cmays@mit.edu)



Remember your personal protective equipment (PPE)

Item	Worn (BE guidelines)
Gloves 	- When working with chemical or biological materials ➢ Change when entering tissue culture room!
Lab coat 	- When working with chemical or biological materials ➢ Change when entering tissue culture room!
Goggles 	- 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

Correctly dispose of waste

regular trash can

benchtop waste

sharps container

liquid waste vacuum flask

Please empty benchtop waste every lab

biowaste box

For today:

- Complete lab orientation with a partner
  - Your ”forever” lab partner will be assigned prior to the next lab session based on questionnaire responses or by request

http://engineerbiology.org/wiki/20.109(F22):Laboratory_tour

- Orientation quiz on M1D1!

For M1D1:

- Complete homework assignments (see ‘Homework’ tab on wiki)

  http://engineerbiology.org/wiki/20.109(F22):Homework

- Prepare for orientation quiz
  - Complete, screen capture EHS training certificate(s)
  - Read Mod1 overview page and M1D1 introduction