

# **Module 2: Gene expression engineering**

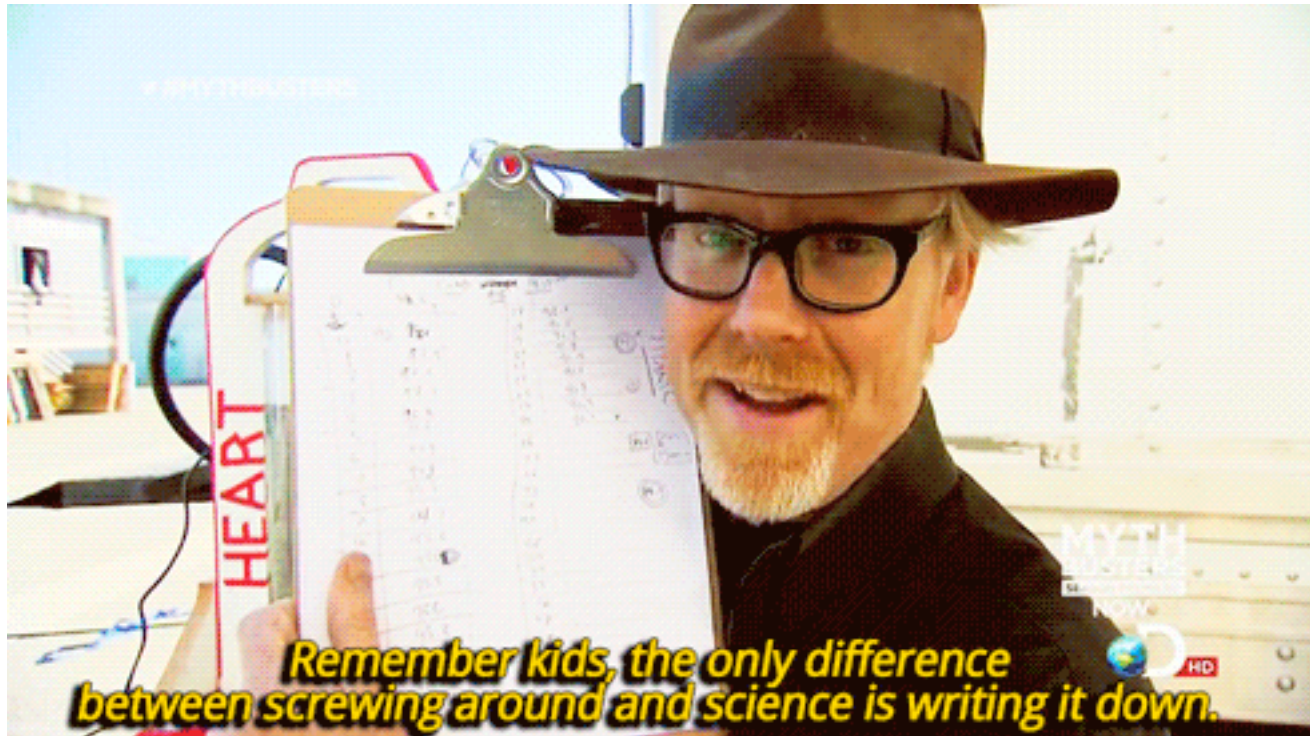
Communicating your science

4/13/17

# Sp17 20.109 progress report

Module	Assignment	% of final grade	Links to description and/or evaluation
1	Data summary	15	<a href="#">Assignment description</a>
	Mini-presentation	5	<a href="#">Assignment description and evaluation rubric</a>
2	Journal club presentation	15	<a href="#">Assignment description and article sign-up</a> <a href="#">↗</a> <a href="#">Evaluation rubric (PDF download)</a>
	Research article	20	<a href="#">Assignment description</a>
3	Research proposal presentation	20	<a href="#">Assignment description</a> <a href="#">Evaluation rubric (PDF download)</a>
	Mini-report	5	<a href="#">Assignment description and evaluation rubric</a>





**Remember kids, the only difference between screwing around and science is writing it down.**

# Manipulating metabolism research article

- Submission due: **Saturday, Apr 22<sup>nd</sup> by 10 pm**
- Completed individually
- Only one draft
- Formatting guidelines:
  - Prepare using WORD
  - Text and figures may be separate documents

# How will we communicate our science?

- Research article structure more formal
  - Title and Abstract
  - Introduction
  - Methods
  - Results
  - Discussion
- Complete sentences and paragraphs
- References

# How will you organize your methods?

Let's first review the methods lessons we learned from our homework...

1. Sub-sections
2. Level of detail
3. Word choices

# Methods: sub-sections

- Use sub-sections to group procedures
  - Include descriptive titles
  - Use logical, rather than chronological order
- Separate sub-sections with titles
  - Brief, but specific
- Include an introductory sentence
  - State the purpose or goal of particular method / group of procedures

# M2 methods sub-sections





# Methods: word choices

- the tube vs. the cell lysate
  - Give more informative, specific information
- combined or mixed vs. digested
  - Be precise about the procedure used
- cleaned vs. purified or isolated
  - Use the more scientific terminology
- in order to vs. to
  - Eliminate unnecessary wordiness
- avoid jargon and define all abbreviations

# Consider sentence structure

“cell lysate was prepared by adding ... and  
proteins were separated using SDS  
polyacrylamide gel electrophoresis (130 V for 45  
min) in TGS buffer ... .”

1. PUT THE SUBJECT FIRST
2. BE SURE THE SUBJECT AND THE VERB MATCH

# Consider motivating and combining information

- Draft as few sentences as possible to describe the following details:
  - Membrane washed with TBST
  - 3 mL TBST added
  - Membrane with TBST incubated on rocking table for 5 minutes at room temperature
  - TBST removed
  - Process completed total of 3 times

# Remember the steps you didn't do

- For time reasons, the teaching faculty completed some procedures...
  - You should still include these!
  - Details are provided on the wiki

**DO NOT WRITE THAT THESE STEPS WERE  
COMPLETED BY TEACHING FACULTY**

What are your data?

# How will you introduce your data?

## Introduction

As you write your introduction, recall the idea of an hourglass structure. The information you use to set up the investigative question in your introduction should be supported by appropriate citations. **Any details you found in another researcher's work should be cited.**

Please pay close attention to the feedback you received from the teaching faculty on your homework assignments as you prepare your introduction (as well as the rest of the report). Also, you may find that the [BE Communication Lab](#) is a terrific resource for providing comments on your Introduction. If the Comm Lab peer tutors (a scientifically literate audience) understand your motivation for the study -- you are in good shape!

The introduction will account for 10% of the final grade for this assignment.

# How will you report your data?

## Potential figures

In most research endeavors, you will collect more data than you ultimately publish. In the spirit of writing a research article, in this assignment you should present only essential data that come together to tell your scientific story. The suggested list of figures below is meant to provide guidance rather than a check-list.

### Schematics / Diagrams

- Schematic of HR and NHEJ pathways with key proteins / products highlighted
- Experimental overview

### Figures

- Western blot analysis of DLD-1 and BRCA2- cell lines
- Quantitative PCR results for p21 transcript levels
- Viability data from NHEJ and PARP inhibitor experiment
- RNA-seq analysis with heat maps / PCA

### Tables / Text

- Genes identified from RNA-seq analysis as upregulated / downregulated

The results section will account for 50% of the final grade for this assignment.



# How will you interpret your data?

## Discussion

This section should incorporate all the good practices described in the Module 1 Data summary, but do so at a more advanced level. You will be expected to cite the broader scientific literature more thoroughly than before to inform your analysis in the discussion. You should also propose specific future experiments and otherwise show that you deeply understand the meaning and significance of your results; for example, if you have a hypothesis about why a particular transcript increased in response to etoposide treatment, consider what follow-up experiments you might try. You may also want to consider how the experiments can be improved; for example, what additional controls might be useful to include. In addition to drawing conclusions from your own data, you are expected to spend some time considering your classmates' data. For example, it would be good to compile all of the data available from the cell viability assay to improve your statistical analysis.

The discussion will account for 10% of the final grade for this assignment.

More specifically, remember Leona's challenge:

2 year grant for 100 K to explore cell behavior

(transcriptome expression, repair capacity functional assays, mutations, etc.)

# Reporting and interpreting your data

## RESULTS

1. What was the overall goal of these data?
  - State concisely as an introductory sentence.
2. If applicable, what was the result of your control?
  - Was it expected?
3. What was your result?
  - Was it expected?
4. What does this motivate you to do next?
  - Specifically, what experiment follows?

## DISCUSSION

1. What evidence do you have that your result is correct or incorrect?
  - How do your controls support your data?
2. In sum, what do your data suggest or indicate?
  - Do your data support your hypothesis? Why?
3. What does this motivate you to do next?
  - Specifically, what is the next research question?

# We are here to help...

- Noreen:
  - Tuesday 3-5p and Wednesday 2-5p
- Maxine:
  - Wednesday 12-2p and Thursday 9:30-11a
- Leslie:
  - Tuesday 9:30-11a and Wednesday 9:30-11a
- And by appointment!

