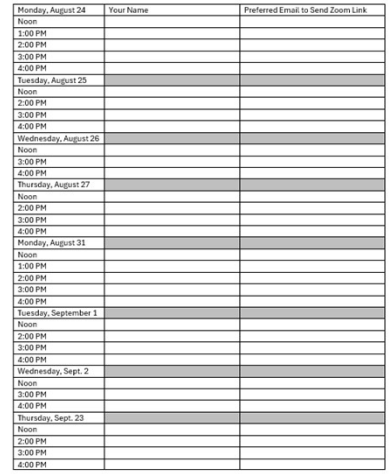
Availability to Match Partners

Please fill out scheduling form if possible.
Return ASAP by email if not.



Monday, August 24	Your Name	Preferred Email to Send Zoom Link
Noon		
1:00 PM		
2:00 PM		
3:00 PM		
4:00 PM		
Tuesday, August 25		
Noon		
2:00 PM		
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Wednesday, August 26		
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Thursday, August 27		
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Monday, August 31		
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Tuesday, September 1		
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Wednesday, Sept. 2		
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3:00 PM		
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Thursday, Sept. 23		
Noon		
2:00 PM		
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4:00 PM		

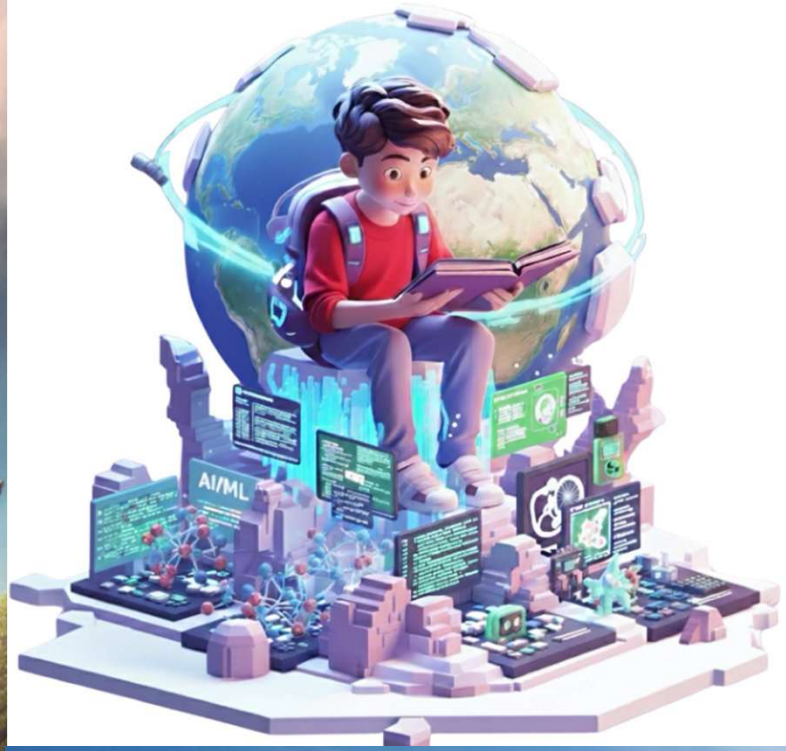
- While most of the assignments will be independent, you will be matched with at least one partner and asked to interact with them at various points in class.
- While little outside of classroom work is <u>required</u>, we do want you to have the option to work with each other if desired, so the primary partner matching will be based upon your shared availabilities. You are allowed/encouraged to work with other classmates though.

Physics 293A
Confidence Survey

A major goal of this course is to help you (and future students) feel more comfortable about doing real scientific research. Thus, we need to measure that comfort level at various points (~every 2 weeks) in the semester, so that we can help design the course better.

You are just starting! It's ok/normal to not yet feel confident with many/all things. It's ok/normal for that confidence to go up and down as you encounter new challenges.

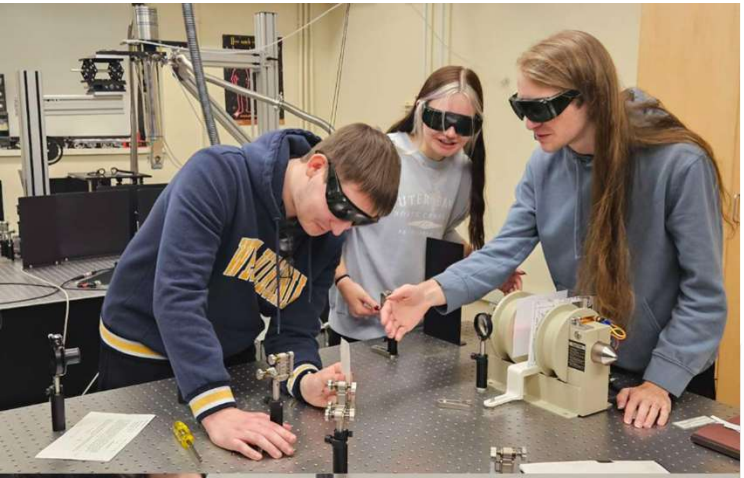
The World Needs More Critical Thinkers and Problem Solvers



Today's Agenda

- Confidence surveys and scheduling
- John's discussion on the interviews
- Introductions
- Syllabus debrief/motivation
- Pre-test
- Reading: background for your projects

- Next Time: What You Need to Know About Magnets



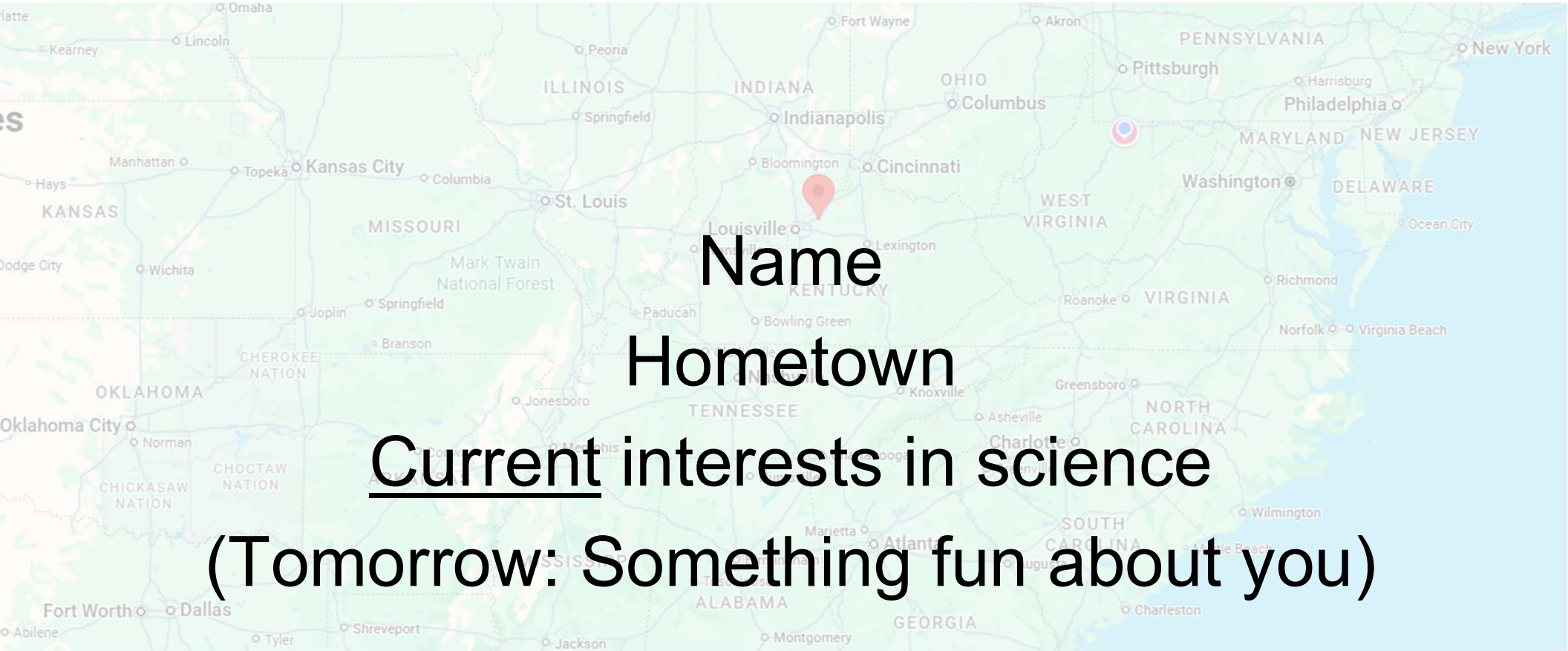
Who are your guides this semester?

- Prof. Micky Holcomb
- Prof. John Stewart (PER)
- Femi Akinrinola
- Raj Bhandari
- Robbyn Trappen (virtual)

- Past 293 students: Ivan, Jeremy, Dorian, Nate
- Optional: Faculty on certain projects
- Each other: don’t underestimate peer help
- The internet can be helpful if you know how to look

Introductions

(If any of you are good at remembering names, I'll give you an opportunity to show off tomorrow.)



Name

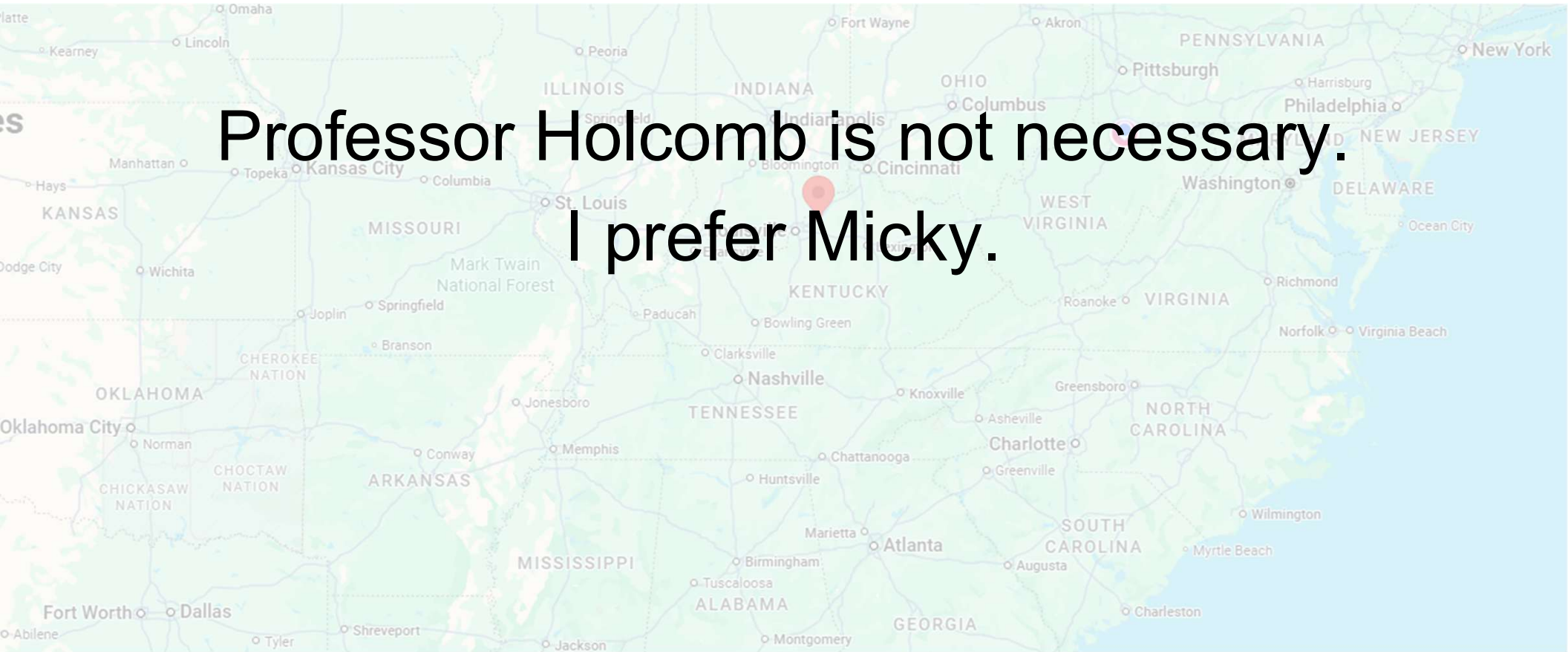
Hometown

<u>Current</u> interests in science

(Tomorrow: Something fun about you)

My Official Name: Mikel (pronounced Michael) No, my parents didn't think I was going to be a boy.

Everyone calls me: Micky. You can too.

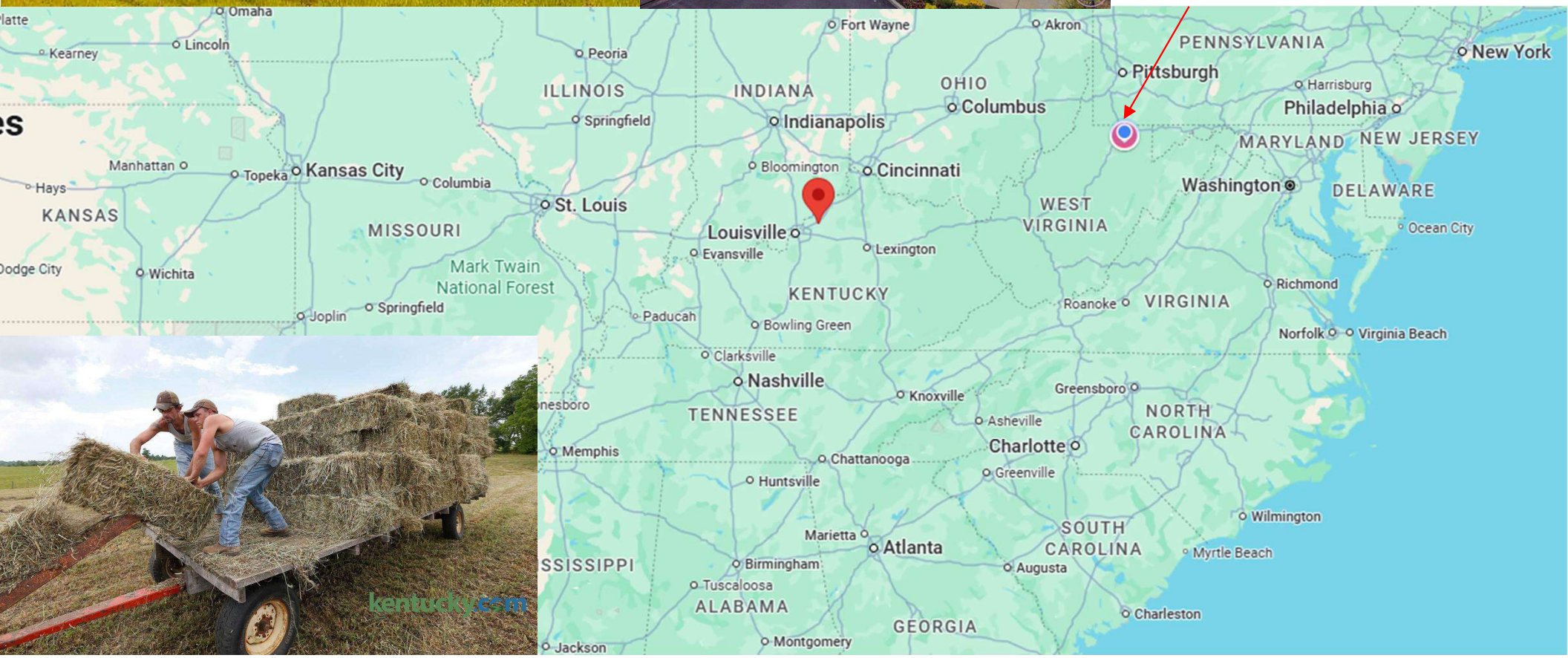


Professor Holcomb is not necessary.

I prefer Micky.

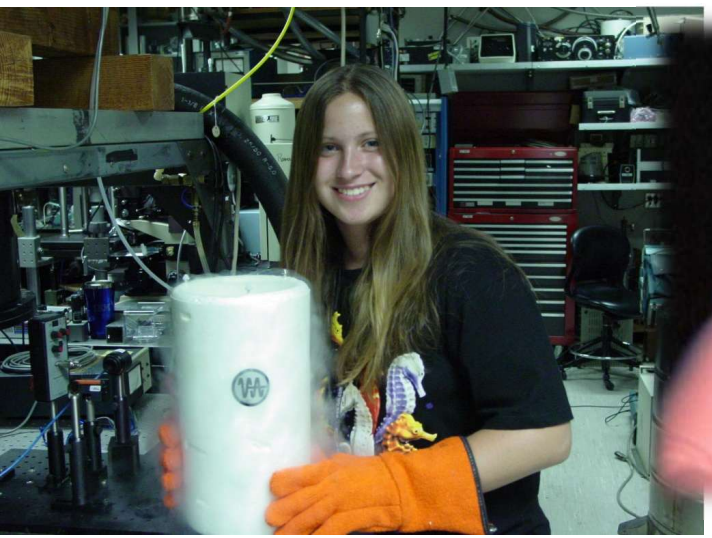
Grew up in rural Kentucky

You are here!



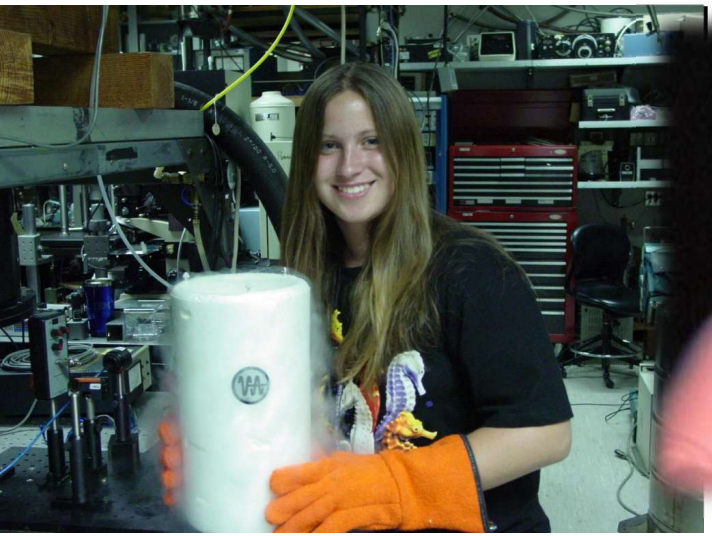
About Your Professor

- Went to school at Vanderbilt and Berke
- Did graduate work at a national lab
- Did internship at IBM on quantum computing

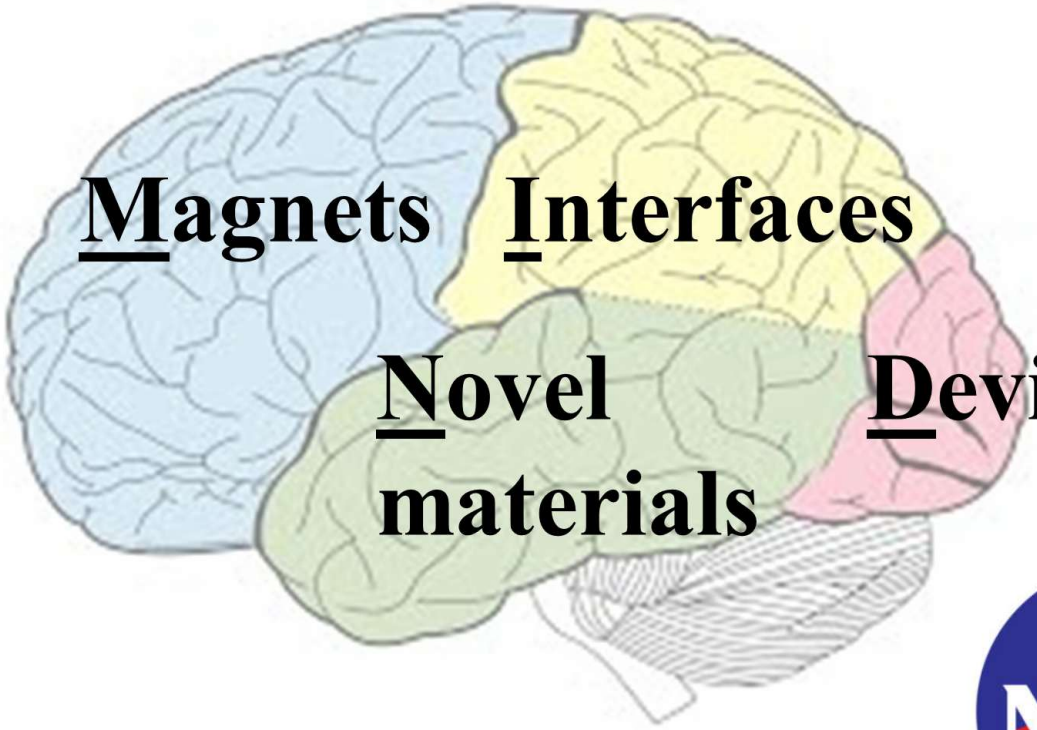


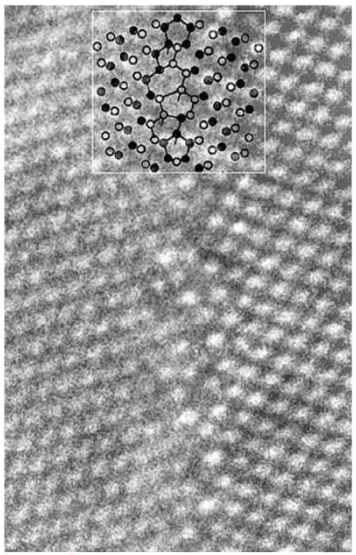
About Your Professor

- Went to school at Vanderbilt and Berke
- Did graduate work at a national lab
- Did internship at IBM on quantum computing
- Toyed with an internet startup

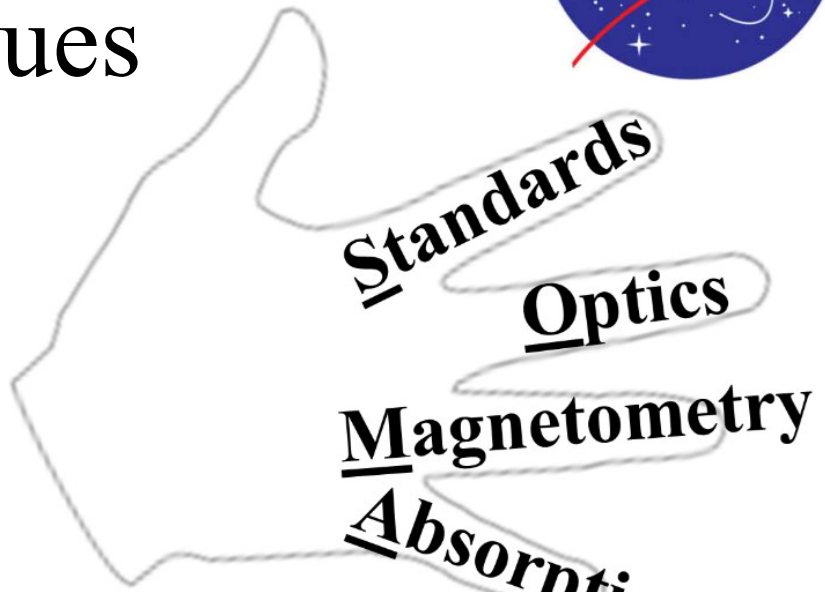


Group Focus: Characterization of the MIND



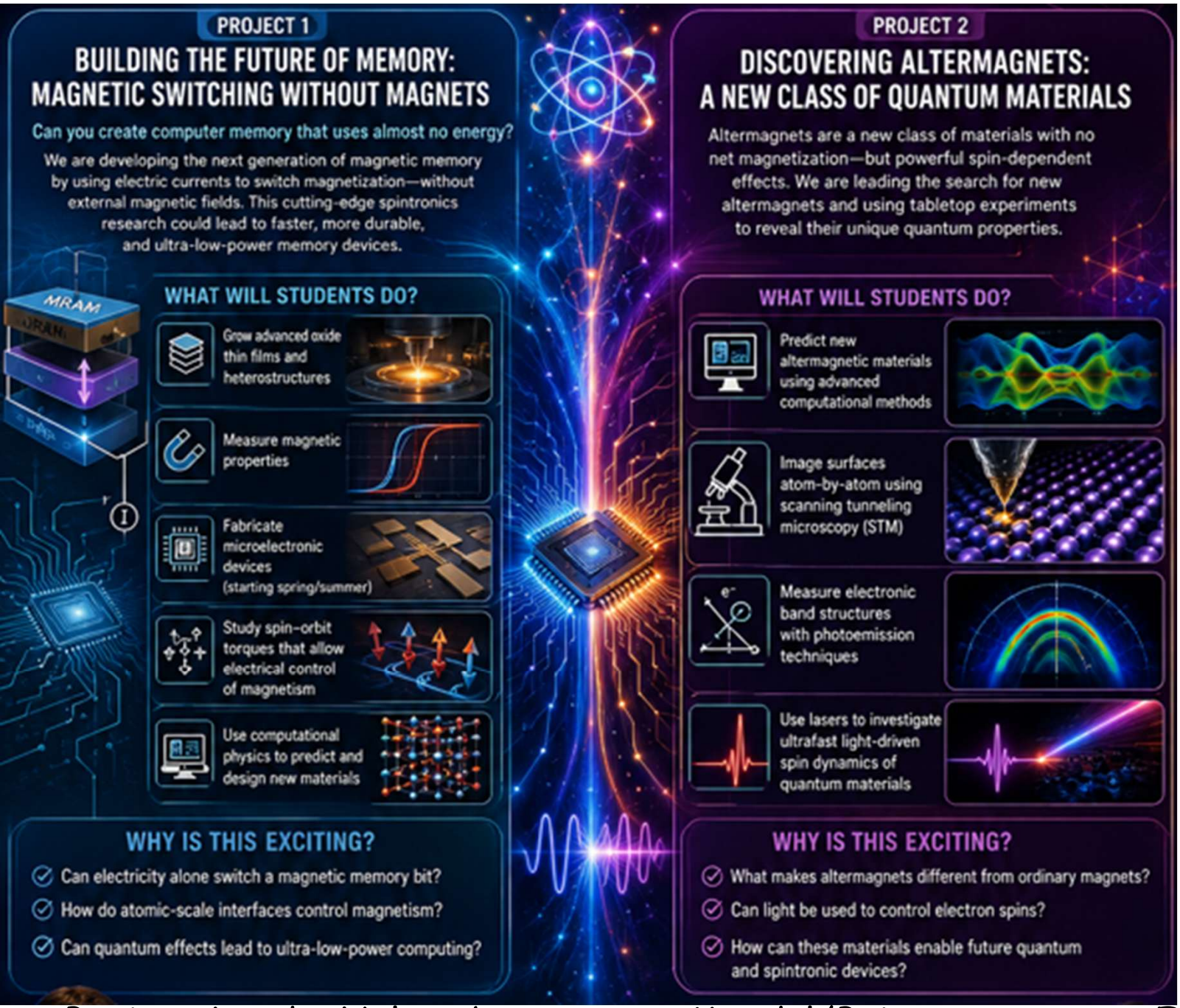


using SOMA techniques



for chemical, field and time sensitivity

Leading $4 Million with U. Delaware



Project 3: Quantum Dots and Quantum Memories: Controlling Spins with Light

Quantum technologies could revolutionize computing, communication, and sensing. One promising approach uses tiny semiconductor structures called **quantum dots**, often described as "artificial atoms," to trap and control individual electrons using light. In this project, researchers are exploring how the spins of electrons inside quantum dots interact with the spins of rare-earth atoms. Understanding these interactions could lead to quantum memories capable of storing information for much longer than current technologies.

Project Leads: Holcomb Mandal/Bristow Flagg

Your Turn
Introductions

Name

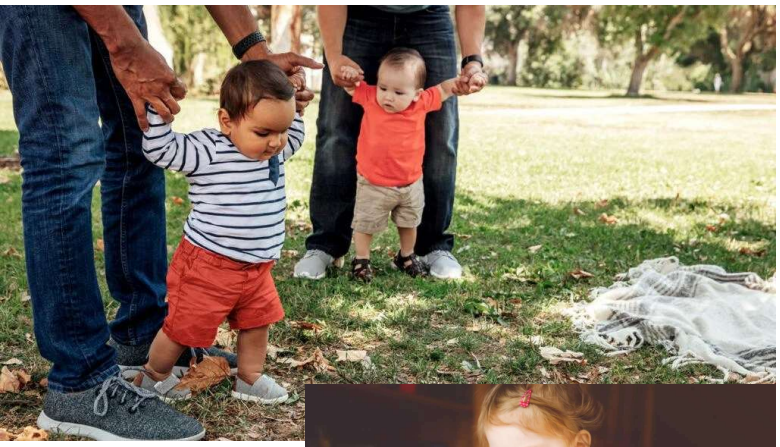
Hometown

Current interests in science

(it's ok to not know or change your mind)

Those not in 191: Something fun about you

I am a strong believer that you can contribute to research before you fully understand everything.



Do we learn the mechanism of walking before we walk?

Of course not. We are guided.

We make mistakes.

Our job is to guide you into learning how to guide yourself to learn things—a skill that will allow you to learn anything you put your mind to!

The biggest benefit of an education in physics is it teaches you how to teach yourself anything. ($$Highly marketable$$)

If you can learn physics, you can learn anything!

We can start to get good at this skill in this course!

Physicists are problem solvers and problems are all around us.

The sky is the limit!

Wait, you could go further than that if you wanted to!

What can I do with a Physics degree?

or minor

Data Science

Engineer

Computer Scientist or IT

Research Scientist

Science Policy

Science Teacher

Biomedical or Medical Physicist

Applied Math

Science Journalism

Business or Financial Analyst

Law

Astronomer

Renewable Energy Scientist

Create
Innovate
Discover
Serve Others

What Will You Gain From This Course

Learning/practicing transferrable skills

- Finding/critiquing “known” information
- Problem planning, solving & documenting
- Networking and working with others
- Communicating complicated topics in written, oral and graphical forms

Opening opportunities

Build a cohort (matters more than you think)

NSF funded this because they care what helps. Let’s tell them.

Feedback appreciated!

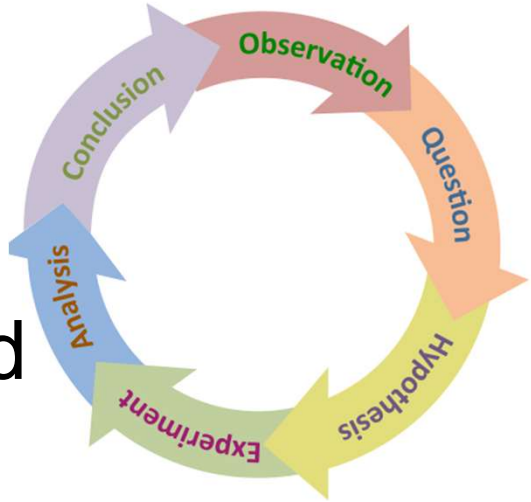
My Grading Philosophy

- While you aren't expected to know much coming into this class, you are expected to try to think critically. It's ok if you get things wrong, but you are expected to try! Your grade will reflect your effort.
- As long as you complete things and put in a good effort, it's extremely unlikely that you could get a C or worse. The difference between an A or a B in my classes typically comes down to if you completed things thoroughly and thoughtfully and followed the directions. There will be rubrics for major assignments.

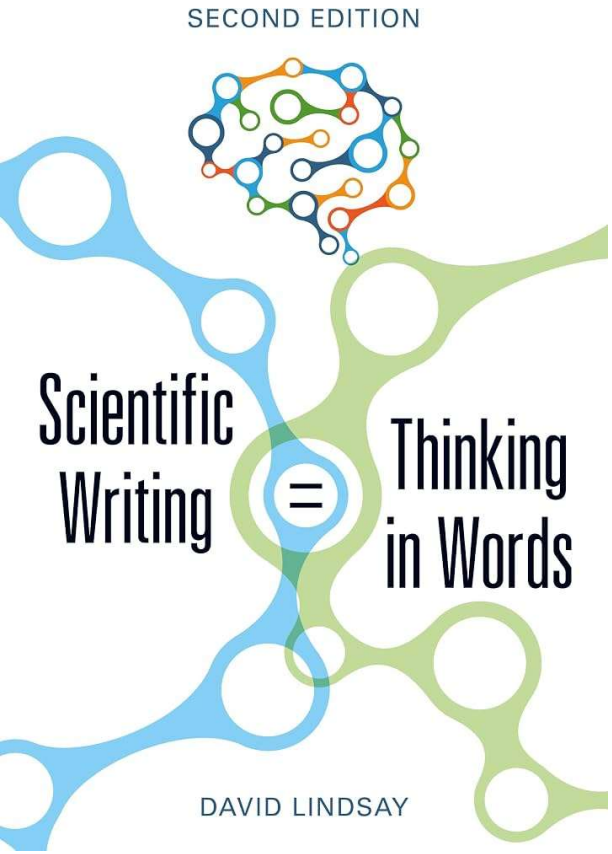
Brief Pre-Test

- Since our goal is to not only improve your confidence in certain skills but improve them, we have a couple of brief questions to see what you know.
- Answer to the best of your ability.
- It is totally acceptable to be COMPLETELY wrong about any of the knowledge questions. We just want to know what you currently think you know.

This Class is Designed to Help You Practice the Scientific Method

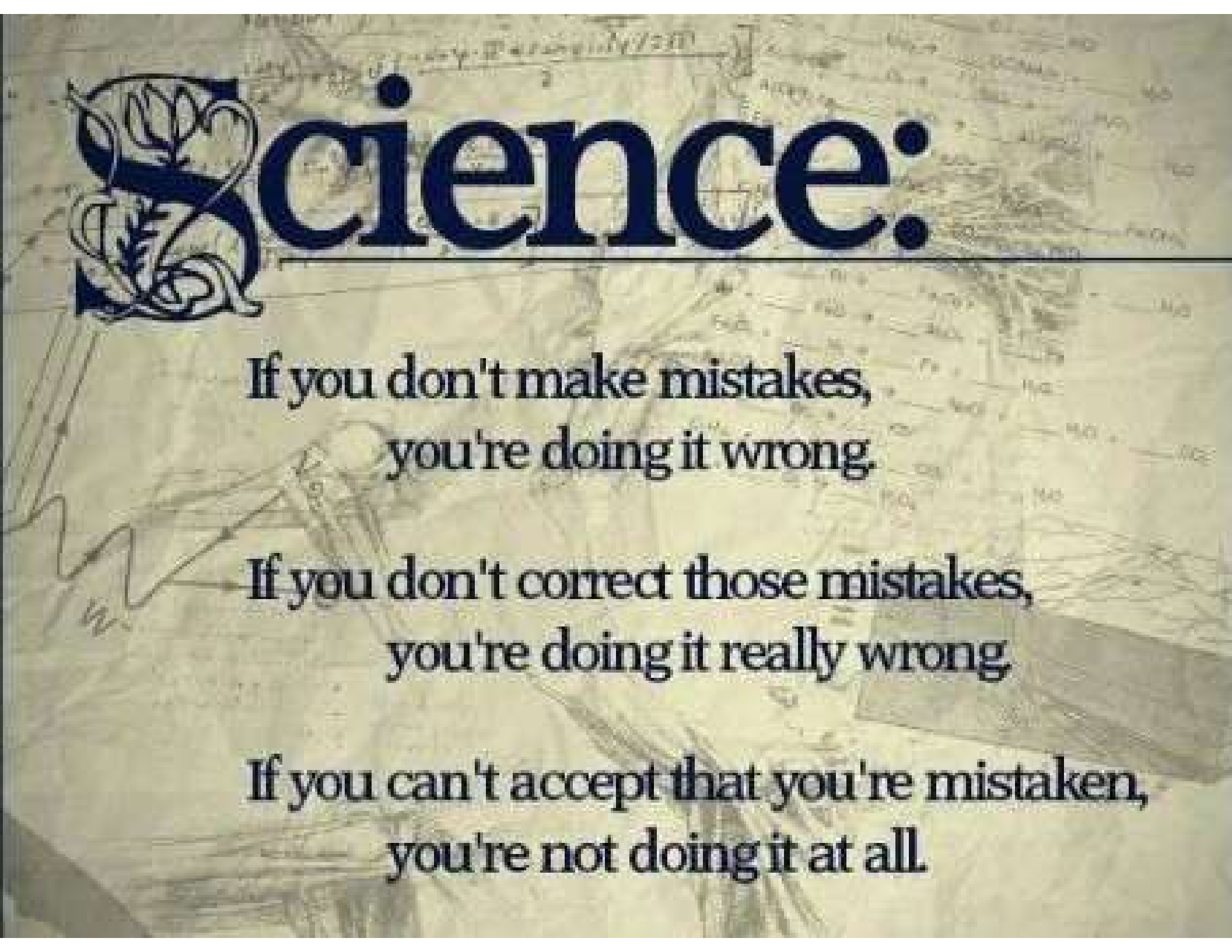


- **Ask a question:** Notice something and wonder why or how it happens.
- **Dig into related past research:** Look at past work or information to learn more.
- **Form a hypothesis:** Make an educated guess or a testable explanation for your observation.
- **Run an experiment:** Test your guess with a controlled test or procedure.
- **Analyze data:** Look at the results to see if they support your guess.
- **Share results:** Tell others what you found!



Research is a process, and not always so organized. You need to talk about your ideas to improve them. That means that your early ideas that you talk and write about will likely have some mistakes. That's ok, as long as you improve!

You WILL write up things before you feel ready. Writing IS thinking. It's ok. This is a safe place to work on improving!


Science:
If you don't make mistakes,
you're doing it wrong.
If you don't correct those mistakes,
you're doing it really wrong.
If you can't accept that you're mistaken,
you're not doing it at all.

Define Topic ⇔ **Gather Sources** ⇔ **Experiment** ⇔ **Analyze** ⇔ **Write**

The process isn't always linear. That's why we'll come back to skills sometimes.

Date	293 Topic	Homework (with goals color)	Topic	Sources	Experiment	Analyze	Write
18-Aug	Pre-Surveys; What is this Class About?	Partner/Scheduling Info					
20-Aug	Distinguishing Types of Magnetism	Reading 1					
25-Aug	Holcomb Group Discovery	Reading 2					
27-Aug	MOKE versus Other Magnetometry	Syllabus Read/Agree					
1-Sep	Project Planning: What Kinds of Magnetic Measurements						
3-Sep	Finding Published Papers Relevant to Your Project	Bring a Related Paper to Class					
8-Sep	Reading and Evaluating Papers	Reading on AI					
10-Sep	Best Practices with Lab Notebooks	Safety					
15-Sep	MOKE Hands-On Demonstration	Short video about light					
17-Sep	VSM Hands-On Demonstration	Important Papers. Why?					
22-Sep	How to Give Peer Feedback and Group Project Planning						
24-Sep	Planning Group Oral Reports and Peer Grading	Mini Reports (in class)					
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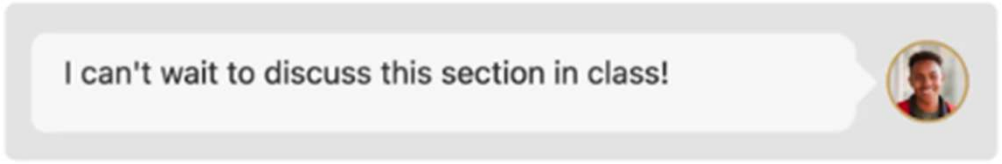
Perusall®

Every student prepared for every class



Perusall is a **free** social annotation tool used to enhance student engagement with reading materials and facilitate collaborative learning.

It allows students to annotate texts, articles, or videos together, fostering discussion and deeper understanding. This discussion is graded (guidance assignment to explain how).

Score	Grade	Feedback
3/3	100%	Wonderful!
2/3	95%	Good!
1/3	70%	Ok, but try to engage more. (on B/C border)
0/3	0%	I do not recommend. Reading early helps!

Define Topic ⇔ Gather Sources ⇔ Experiment ⇔ Analyze ⇔ Write

The process isn't always linear. That's why we'll come back to skills sometimes.

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Your first assignment is two reading assignments, due before next class. It is on Perusall, which you can find the link to on ecampus. The first assignment is just getting used to Perusall and how it grades. The second is actually reading about magnetism and commenting like Perusall wants you to. (Comments encouraged before 5pm night before so I can tailor class to questions.)

We will only use Perusall a few times.

Grade Breakdown
(A rubric will be provided)

Homework (rubric for graphing your work)	20%
Participation	20%
Lab Notebook Documentation (1/4 initial check-in, 3/4 at end)	20%
End of Semester Group Presentation	20%
Long Abstract of Experimental Results	20%

Research is different from typical classwork, and thus an easier grading scale is reasonable.

Grading scale: A (>85), B (70 - 85), C (55 - 70), D (40 - 55), F (<40)

Slides can be found at: Click on the magnetism class tab at

https://community.wvu.edu/~miholcomb/phys191.html

PHYSICS

HOME

191 CLASS

293 CLASS

ADDITIONAL MATERIALS

BACK TO RESEARCH

Main goals of the 293 class

Introduction to basic research principles, including literature searches, graphing and presentation
Introduction to sample growth and characterization
Practice in research and scientific communication (in both oral and written form)
Learning to seek feedback from peers and various advisors on how to improve research
Learning how to take ownership of your own research (AKA don't wait on the professor to bug you)

Fall 2026 Lectures

August 18 What you will be learning in Physics 293
August 20 Distinguishing types of magnetism
August 25 The novel magnetism our group discovered

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Feedback Scaffolding

How do the pieces fit?

Project Proposal

What kinds of measurements are planned?

Why do you think this work could be important?

What do you think you will learn about?

What material will you measure? Why did you pick this material?

Early Lab Notebook

Category
Introduction/ motivation/ goals
Figures explaining the background
Description of the uniqueness of the material

Any Questions about the Syllabus/Course Goals?

Guiding You Through Research

- **Project proposal** lets you propose your project and get feedback.
- Most of this is critical for your **lab notebook background planning**, which gets turned in for additional feedback.
- Lots of people as questions during experiment
- Later assignment: **Graph your data** to get more feedback on graphing
- Opportunities to present/discuss your research with peers and to professor/TAs

Define Topic ⇔ **Gather Sources** ⇔ **Experiment** ⇔ **Analyze** ⇔ **Write**

The process isn't always linear. That's why we'll come back to skills sometimes.

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Math Readiness

- Don’t worry about it!
- This course is designed to be approachable with basic algebra skills
- However, if you’d benefit from exploring some basic applications of calculus at this point, that is an option (but not required)