LECTURE 2

ACADEMIC SCIENCE

+ LAB CULTURE
NOTE TO PRIYA:
RECORD LECTURE
RULES OF ENGAGEMENT

Be Open & Encouraging

Communicate Effectively & Respectfully

Contribute / Participate In Group Conversations

Step Up / Step Back: Give people time/space to answer
MAKE A PLAN TO VOTE

https://makeaplantovote.com/
Undergraduate Research Week

https://urc.ucdavis.edu/URWeek-Schedule
Would you like the support of a peer or graduate student mentor?

https://airtable.com/shrVKlnxWoa0E8dwp
BML SEMINAR SERIES

Wednesdays, 1-2pm PT

Opportunity to learn about cutting-edge research

https://marinescience.ucdavis.edu/events
ACTIVITY – ABOUT YOU!

In breakout sessions of 3 people each ...

Share a fun **boring** fact about yourself

Share something you’re hoping to get out of this class
ACTIVITY – ABOUT YOU!

In breakout sessions of 3 people each ...

SHARE SOMEONE ELSE’S FUN BORING FACT

SHARE SOMETHING SOMEONE ELSE IS HOPING TO GET OUT OF THIS CLASS
ACTIVITY – ABOUT YOU!

In breakout sessions of 3 people each ...

In the future, these “ice breakers” will be used to share the resource you found to better your understanding of that week’s topic!
ACADEMIC SCIENCE & LAB CULTURE
WARM-UP IN GOOGLE JAMBOARD!

https://jamboard.google.com/d/1b719lhST642KeNzR0AcRism51yq9os7gdVaLAkuYUCc/edit?usp=sharing
ACADEMIC SCIENCE & LAB CULTURE
ACADEMIC SCIENCE & LAB CULTURE
ACADEMIC SCIENCE & LAB CULTURE
HISTORY OF ACADEMIC SCIENCE
Justice
Equity
Diversity
Inclusion

JEDI MIND TRICKS
HISTORY OF ACADEMIC SCIENCE

Polynesian Navigation

Middle Eastern Experiments

Mesopotamian Engineering
HISTORY OF ACADEMIC SCIENCE

Musaeum of Alexandria
367 – 283 BC

Nanjing University
258 - Present

Takshashila
Destroyed in the 400s
The term *academy* originates from Plato’s “Akademy”, a school of philosophy north of Athens, Greece founded in ~ 385 BC.

*Academia* today encompasses the idea of *accumulating and transmitting knowledge* as well as practitioners of these activities.
Many monks and priests established the very first schools of advanced study.

Attendees could receive an education without paying for it!

It’s why Gregor (Johann) Mendel joined an Augustinian monastery & entered the Dept of Natural History & Agriculture.

Gregor Mendel
Father of modern genetics
Military academies were also important institutions of higher learning, where advancements in engineering and exercise physiology were made.

École militaire, Paris, France
Founded by King Louis XV in 1750
HISTORY OF ACADEMIC SCIENCE

The first European Academy of Science was the Italian “Accademia dei Lincei”, established in 1603.

Other academies – funded by the aristocracy – were established across Europe until ~1800.

Accademia dei Lincei
Rome, Italy
“Academies” were/are different than Academic Societies, which were members-only groups of researchers who studied the same subjects and would present their work to one another.
“Academies” were/are different than Academic Societies, which were members-only groups of researchers who studied the same subjects and would present their work to one another.

Many societies also publish (niche) journals with novel, peer-reviewed research.
Publication has been and continues to be the main way that scientists disseminate information.
HISTORY OF ACADEMIC SCIENCE

Peer Review

1665: The editor of the Royal Society of London's scientific journal chooses what to publish.
**HISTORY OF ACADEMIC SCIENCE**

Peer Review

**1665**: The editor of the Royal Society of London’s scientific journal chooses what to publish.

**1833**: Anonymous reviewers are seen as the “Defender” of a Society’s reputation.
1665: The editor of the Royal Society of London’s scientific journal chooses what to publish.

1833: Anonymous reviewers are seen as the “Defender” of a Society’s reputation

1894: Peer Review becomes a systemic part of the scientific process to reduce the “sewage thrown into ... science”
HISTORY OF ACADEMIC SCIENCE

Peer Review

1665: The editor of the Royal Society of London’s scientific journal chooses what to publish.

1833: Anonymous reviewers are seen as the “Defender” of a Society’s reputation.

1894: Peer Review becomes a systemic part of the scientific process to reduce the “sewage thrown into … science”

Today: Still a work in progress – many efforts to reduce bias, improve transparency & speed up the process!
The first European Academy of Science was the Italian “Accademia dei Lincei”, established in 1603.

Other academies – funded by the aristocracy – were established across Europe until ~1800.

In the 1800s, universities were tasked with performing experimental research, shuttering many academies.
The granting of Bachelor's, Master's, and Doctorate degrees dates back to medieval Europe.

“Doctor” became the highest possible degree awarded for those in Law & Medicine in the 1300s.
Universities roughly fall into two categories:

- RESEARCH INSTITUTIONS
- PRIMARILY TEACHING INSTITUTIONS

Examples:
- University of California
- CSU (California State University)
Universities roughly fall into two categories:

**RESEARCH INSTITUTIONS**

Institutions that grant PhDs

**Tiers of research**:  
- **R1**: “Highest Research Activity”  
- **R2**: “Higher Research Activity”  
- **R3**: “Modest Research”  

* established by the Carnegie Classification of Institutions of Higher Education
WHAT TIER DO YOU THINK UC DAVIS IS?
WHAT TIER DO YOU THINK UC DAVIS IS?
THIS SLIDE
INTENTIONALLY LEFT BLANK
WHAT TIER DO YOU THINK UC DAVIS IS?

101
GRADUATE PROGRAMS

102
UNDERGRADUATE MAJORS

R1
“Highest Research Activity”
ACADEMIC SCIENCE & LAB CULTURE

ABOUT PRIYA

Bodega Ocean Acidification Research Technician

Bodega Ocean Acidification Research (BOAR)
7-MINUTE BREAK
ACADEMIC SCIENCE & LAB CULTURE
Everybody washes dishes, but this is a cynical joke. "Dishwasher" is not a real position!
WHAT DRIVES THE RESEARCH IN A LAB?
WHAT DRIVES THE RESEARCH IN A LAB?

PI'S EXPERTISE / INTERESTS

Brian Gaylord

Google Scholar
WHAT DRIVES THE RESEARCH IN A LAB?

PI'S EXPERTISE / INTERESTS

Brian Gaylord

Ocean Acidification

Google Scholar

Evolutionary change during experimental ocean acidification
MH Pespeni, E Sanford, B Gaylord, TM Hill, JD Haszprunar, HK Jaris,
Proceedings of the National Academy of Sciences 110 (17), 6937-6942

Mechanical cost of elevated CO2
B Gaylord, CAB, B. J. G., Ecological monograph 1994

Functional impacts of ocean acidification in an ecologically critical foundation species
B Gaylord, TM Hill, E Sanford, EA Lanz, LA Jacobs, KN Sato, AD Russell, ...
Journal of Experimental Biology 214 (15), 2586-2594

Ocean acidification through the lens of ecological theory
B Gaylord, KJ Kroeck, JM Sunday, KM Anderson, JP Barry, NE Brown, ...
Ecology 96 (1), 3-15

Persistent carry-over effects of planktonic exposure to ocean acidification in the Olympia oyster
A Hettinger, E Sanford, TM Hill, AD Russell, KNS Sato, J Hoey, M Farach, ...
Ecology 93 (12), 2758-2768
WHAT DRIVES THE RESEARCH IN A LAB?

PI'S EXPERTISE / INTERESTS

Brian Gaylord

Modulation of wave forces on kelp canopies by alongshore currents

Brian Gaylord
Marine Science Institute, University of California, Santa Barbara, California 93106

FUNDING

Kelp Recovery Research Program: Request for Proposals

- A multi-pronged approach to kelp recovery along California's north coast
  Brian Gaylord, Marissa Baskett, Aurora Ricart (UC Davis), Matt Edwards (San Diego State University), Mackenzie Zippay, Brent Hughes, Sean Place (Sonoma State University), Jason Hodin (University of Washington)
WHAT DRIVES THE RESEARCH IN A LAB?

STUDENT'S EXPERTISE / INTERESTS

FUNDING

Dr. Nancy Foster Scholarship Program

“I will never forget I didn’t do it alone—it was a combination of hard work, luck and a helping hand along the way.”
WHAT DRIVES THE RESEARCH IN A LAB?

STUDENT'S EXPERTISE / INTERESTS

FUNDING

This could be you

Research Experiences For Undergraduates
WHO FUNDS RESEARCH?

**FEDERAL**
Basic & applied research depending on agency

**STATE**
Applied research for regional management needs

**PHILANTHROPIC**
Widely varying, but topic-dependent

**PRIVATE**
Depends on organization’s needs/goals
WHAT DRIVES THE RESEARCH IN A LAB?

STUDENT'S EXPERTISE / INTERESTS

FUNDING

This could be you

Research Experiences For Undergraduates
But you don’t generally start off with an immersive research experience...
You might, in fact, start here (or doing some other mundane task). Not because you & your skills are not valued, but because it takes time to build trust.

**STARTING OUT IN A LAB**

You will be given tasks that are directly related to the research!
STARTING OUT IN A LAB

You may be intimidated, and that’s okay!

No matter what you’re doing, always try to remember how it connects to the research project.

Listen to the work happening around you so that you can figure out the lab dynamic.

Start keeping a lab notebook – even if it’s just to record how you’re spending your time at first.

Be a team player (offer to help when you reasonably can).

Ask questions!

Start reading relevant scientific papers (ask your mentor what these are).
Why am I working with grad students & post-docs if it’s the Principal Investigator’s lab?
DOING RESEARCH

... can be exciting & intimidating too!

DATA ENTRY / DATA ANALYSIS

LAB WORK

FIELD WORK

Undergrad: Jackie

ME!
DOING RESEARCH

... can be exciting & intimidating too!

DATA ENTRY / DATA ANALYSIS

LAB WORK

FIELD WORK
For some, this can seem like it’s still pretty mundane …

… but you are handling the raw materials of your research mentor’s science!

This is a great opportunity to learn quantitative skills (coding, data visualization, statistics!)

So, be careful & double-check your work!

**IT'S OKAY IF YOU MAKE MISTAKES!** Science is full of failure.
DOING RESEARCH

... can be exciting & intimidating too!

DATA ENTRY / DATA ANALYSIS

LAB WORK

FIELD WORK
LAB WORK

This is the kind of work that takes patience and practice …

… so be prepared to do several trial runs before you work with real samples!

These are marketable skills that can help you get a job / into grad school!

What’s most important is YOUR SAFETY, then DATA QUALITY.

IT’S OKAY IF YOU MAKE MISTAKES!
Science is full of failure.
DOING RESEARCH

... can be exciting & intimidating too!

DATA ENTRY / DATA ANALYSIS

LAB WORK

FIELD WORK
FIELD WORK

This is the kind of work that gets you out into the ocean (yay!) ... … but it can seem scary and/or physically taxing!

Trust your gut – if you don’t feel comfortable doing it, don’t.

But also keep an open mind – fieldwork is very fun and builds skills in a different way.

Overall, YOUR SAFETY IS MOST IMPORTANT.
ONE LAST NOTE ON (DIS)COMFORT

You should feel comfortable going to the PI or grad student to let them know if something makes them feel uncomfortable!

Your mentor’s goals is to help develop your passion.

Lab’s are busy places with lots of backlog – there’s always something else for you to help with!
DOING RESEARCH

... can be exciting & intimidating too!

DATA ENTRY / DATA ANALYSIS

LAB WORK

FIELD WORK
DOING RESEARCH

If you end up being significantly involved in a project, or even starting a project of your own …

… ask about presenting that research at a conference as a talk or poster!

And, don’t be afraid to ask if the lab can help support your attendance at the conference!
RESEARCH IS COMMUNAL

Once you join a lab ...

... you will likely be invited to do more than just the tasks you have been assigned.

LAB MEETINGS: Where papers & ongoing research are discussed

- Helping with experiments that have multiple components
- Attending research seminars
- Helping with a lab member’s fieldwork

Helping with a lab member’s fieldwork
COLLABORATION IN SCIENCE

Brian Gaylord

Eric Sanford

Tessa Hill

Bodega Ocean Acidification Research (BOAR)
COLLABORATION IN SCIENCE

Science is the name but collaboration is the game

CATS   GREAT PETS
TERIBLE LAB PARTNERS
SCIENCE IS IMPERFECT

If an experiment doesn't work or your data don't make sense – that's okay & not tied to your self-worth!

SCIENCE IS INHERENTLY ITERATIVE – so you learn from one failure and improve the next time!
WHAT IF YOU DON’T LIKE WORKING IN A LAB?

It’s PERFECTLY NORMAL for you to decide that research isn’t for you!

I worked in 6 labs before figuring out what sort of research I liked!

And, I enjoy my PhD research, but I don’t want to do it for a living!
ACADEMIC SCIENCE & LAB CULTURE

ABOUT PRIYA

Bodega Ocean Acidification
Research Technician

Bodega Ocean Acidification Research (BOAR)
NEXT WEEK

SCIENCE WRITING
BEFORE CLASS NEXT WEEK

Complete Assignment 2
QUESTIONS?