How to get from here to there: Graduate school writing workshop Part I

NSF Graduate Research Fellowship Program: Writing Your First Grant Application!

Sally Pasion, San Francisco State
Koni Stone, Stan State
Lani Gleason, CSU Sacramento
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CSUPERB Symposium 2022

Applying to NSF GRFP as a CSU Undergraduate

Lillian Murphy

CSUPERB Symposium 2022

Contact: Lmurphy1@berkeley.edu

Academic Journey

Early years

Favorite Childhood Activities:

Dancing, Swimming, Water Polo

In the 6th grade, I had **Mononucleosis** and was hospitalized → goal to become physician

Graduated high school in 2014

Academic Journey

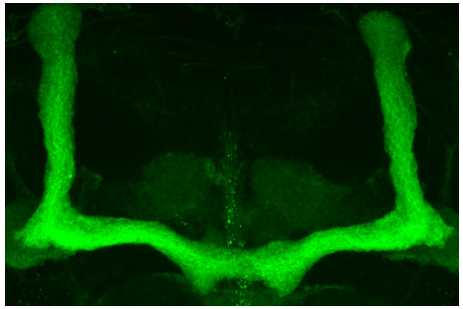
Start of undergrad: CSU Sacramento (CSUS)

- Declared biology major after 1st year (2015)
- 2016: Unsure if pre-med was right for me → advised to try research
- Attended a seminar given by Professor Kimberly Mulligan
  - Applied to her lab and got a position! Started research summer 2016

Academic Journey

CSUS Undergraduate Research

- Identified environmental chemicals that increase the risk of neurodevelopment disorders using *Drosophila melanogaster* (fruit fly)
  - Polychlorinated bisphenol 95 (PCB-95)
  - Bisphenol-A (BPA)
  - Polybrominated diphenyl ether 47 (PBDE-47) and its metabolites



- First-hand experience developing protocols and troubleshooting
- Lead a project from start to finish, culminating in a second author publication

Academic Journey

CSUS Undergraduate Research

- Paid to conduct research by:
  - NIH **RISE** Research Scholars Program
  - NSF **CSU-LSMAP** Research Scholars Program
  - CSUS Summer Undergraduate Research Experience (SURE) Award
- Programs gave me additional support and guidance
- Presented at many on and off campus conferences
- Mentored fellow undergraduate students
- Received presentation and travel awards
- Gallbladder removal **delayed** graduation…

Academic Journey

Summer research at another university

Amgen Scholars Program at UC Berkeley

Summer of 2019

Worked in Kaoru Saijo's Lab

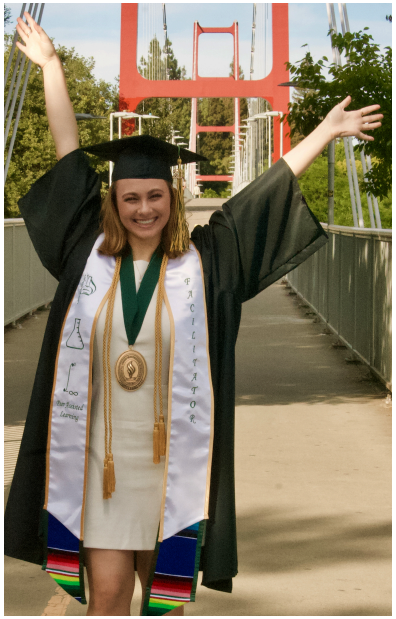
- Developed tools to investigate the role of transcription factor 4 (TCF4) in astrocytes and neurodevelopment
- Networked, learned new skillsets, and experienced working with PhD students and post docs

Academic Journey

Senior year at CSUS

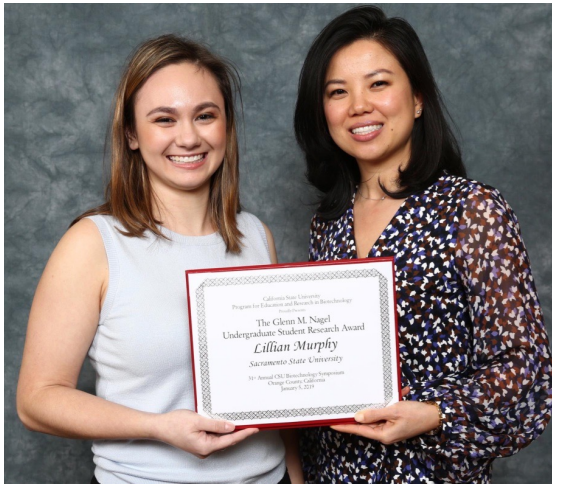
- Applied to **NSF GRFP**
  - Prior research experience helped generate novel NSF research proposal
  - Wrote about returning to UC Berkeley and working in the Saijo lab
  - Received input from **<u>multiple</u>** CSUS faculty and UC Berkeley graduate students who applied and/or awarded GRFP

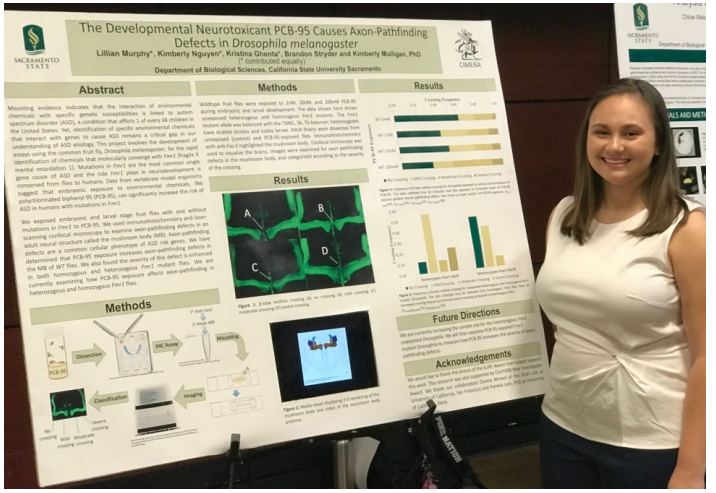
- Applied to PhD programs and went to interviews
- Graduated Spring 2020 with awards



GRFP application
Science communication

- *"…extensive presentation experience, and has been recognized for this success with presentation awards"*
- Presented at:
  - CSUPERB → Glenn Nagel award
  - SACNAS
  - Society of Developmental Biology Conferences → Best Undergraduate Poster
  - CSUS on-campus symposiums





Applying for travel awards helps!

GRFP application
Outreach

- *"…demonstrates a commitment to peer teaching and promoting the diversity and inclusion"*

- Worked as a Peer Assisted Learning (PAL) Facilitator
  - Supported students taking Introductory Chemistry and Molecular Cell Biology classes by promoting group work

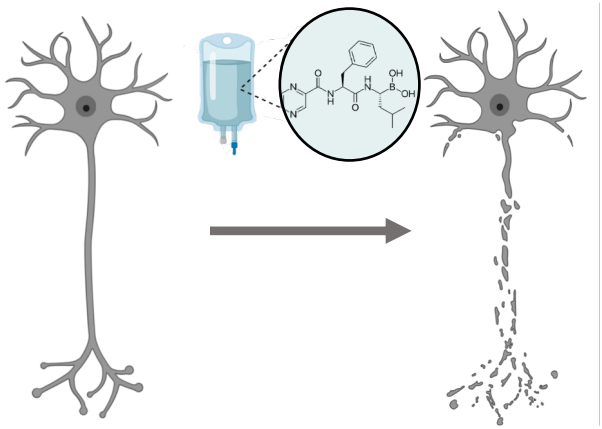
- Member of SACNAS at Sac State chapter and attended SACNAS conferences

Academic Journey

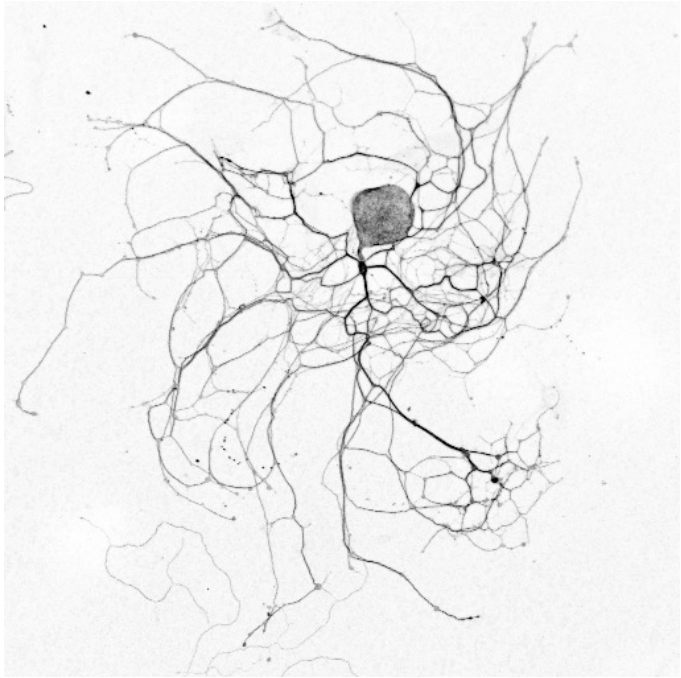
Currently in Graduate School

Molecular and Cell Biology (MCB) PhD program
at UC Berkeley starting Fall 2020

- Joined Ellen Lumpkin and Diana Bautista's lab
- Screening for drugs that prevent chemotherapy induced nerve damage
- Taught physiology last semester



How do we sense touch, itch and pain?



Benefits of applying to the GRFP as an undergrad

- Used statements from GRFP application as base for grad school applications
- Allows you to apply *again* if necessary once you are in grad school
- Undergrad applications not compared to grad applications = different expectations
- Secured funding before starting grad school
- Gave me **confidence** that I ***am*** a scientist by just turning in the application
- Nothing to lose with trying to apply!

Other benefits of applying to the GRFP

- Allows you more freedom when choosing a lab to join
- Gives you **more** time to focus on research and coursework once in grad school
- Short grant – more manageable learning experience
- Internship opportunities
- GSI (teaching) stipend is added on top of GRFP stipend = **extra** funding
- **Prestigious** award to add to your CV and presentations
- Helps to receive more fellowships
- "I am an NSF Fellow"

You *are* an ideal applicant

- You have a ***unique*** story to share
- CSU students have more **hands-on** lab experience
- Smaller class sizes allow for possibility of faculty to get to know you well
- My GRFP reviewers noted my very strong recommendation letters
- Support from faculty
- Opportunities for outreach, research, and conference presentations
- You are here at this CSUPERB conference!

Other pieces of advice

- Alex Lang's website (https://www.alexhunterlang.com/) = very helpful resource with past GRFP applicant materials
- Start application **early**!
- **Clearly** state/explain your experiences, goals, and plans in statements
- Follow **all** directions and instructions on submission
- Find **multiple** people to read your statements
- Apply to summer research opportunities!
  - NSF REUs, Amgen Scholars Program, SURF

Acknowledgements

CSUPERB organizers
Lani Gleason, PhD

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Mulligan lab members

Kaoru Saijo, PhD, MD
Laura Craciun

Ellen Lumpkin, PhD
Diana Bautista, PhD

NSF GRFP
MCF NIH T32 Training Grant

Questions?

Contact info: lmurphy1@berkeley.edu

Reach out with any further questions!

What is the NSF GRFP?

www.nsfgrfp.org

- **N**ational **S**cience **F**oundation
- **G**raduate **R**esearch **F**ellowship **P**rogram
- Supports **Graduate Study** leading to **research-based Master's and Doctoral degrees** in STEM or in STEM education.
- The application will show how the applicant has **Demonstrated Potential** for significant research achievement in STEM or in STEM education
- **Three years of support** in graduate program ($34K to student, and $12K to institution, per year) over up to a 5-year period.
- **2000** awards made each year (~16% award rate)

https://www.nsf.gov/pubs/2021/nsf21602/nsf21602.htm

Who is Eligible to Apply?

- Senior undergraduates, postbac (not in graduate program)--*no limit to number of applications,* or
- 1st or 2nd year graduate students (Masters or Ph.D., apply only once)
- Have completed no more than twelve months of full-time graduate study (or the equivalent)
- US citizen, national, or permanent resident
- Must be **enrolled** in
  - a university, college, or non-profit academic institution of higher education accredited in the United States, its territories, or possessions, or the Commonwealth of Puerto Rico that offers advanced degrees in STEM or STEM education no later than fall of the award year
- Must be accepted in graduate program at time of Fellowship acceptance (May 1 of award year)

What disciplines? When do I apply?

- STEM or STEM education
  - Not professional health science degree
  - Not clinical or patient-oriented project
  - Not directly health-related
- Application deadlines in late October (varies by discipline)
  - Due by 5pm local time of applicant

Fields of Study	**2022 Deadlines**	**2023 Deadlines**
Life Sciences	October 18, 2021 (Monday)	Similar, but check with NSF
Computer and Information Science and Engineering, Materials Research, Psychology, Social Sciences, STEM Education and Learning	October 19, 2021 (Tuesday)	
Engineering	October 21, 2021 (Thursday)	
Chemistry, Geosciences, Mathematical Sciences, Physics and Astronomy	October 22, 2021 (Friday)	
Reference Letter Submission DEADLINE 5pm EST	Oct 29, 2021 (Friday)	

Application Components

TWO STATEMENTS

1) Personal, Relevant Background, and Future Goals (3 page limit)

1) Graduate Research Plan (2 page limit)

THREE Letters of Recommendation – minimum of 2, 3 recommended, 5 maximum (2 page limit)

Official Transcripts (no GREs)

Graduate Research Plan

Research Plan Fills a **Knowledge Gap**

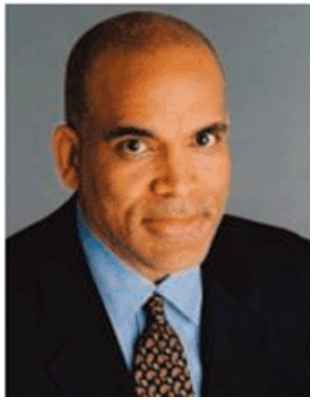
Citations Acknowledge What's Already Known

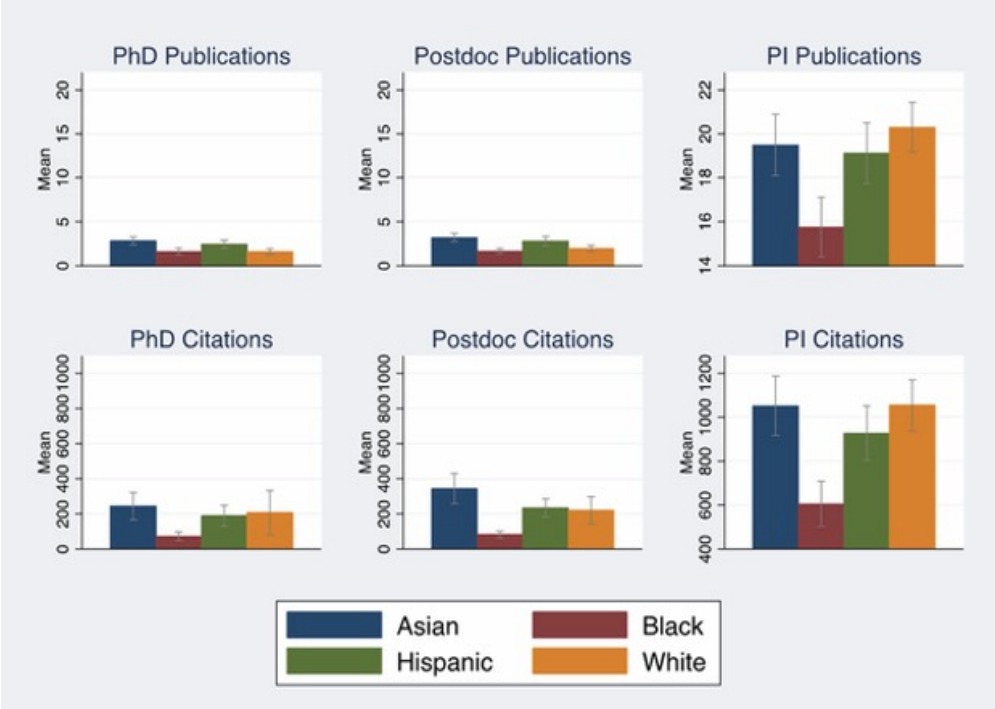
PEERs and Women are Chronically **Under-Cited**

Under-Citation Contributes to **Less Grant Funding**

STUDY AT A GLANCE

83,188	R01 applications from Ph.D.s analyzed
40,069	Unique Ph.D. investigators
1149	R01 applications from black Ph.D.s
337	Expected awards to black applicants if same success chance as whites
185	Actual awards to black applicants

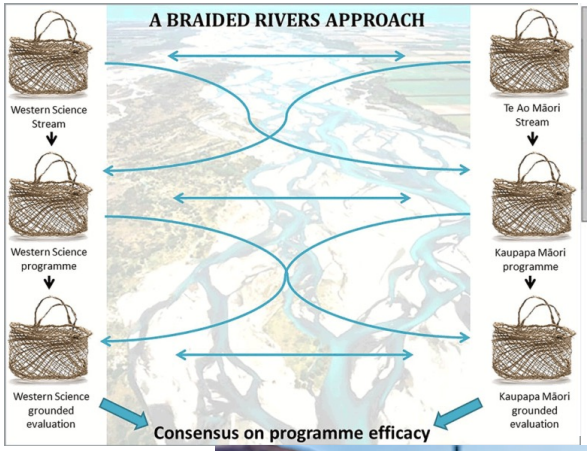




Ginther DK, Basner J, Jensen U, Schnell J, Kington R, et al. (2018) Publications as predictors of racial and ethnic differences in NIH research awards. PLOS ONE 13(11): e0205929. https://doi.org/10.1371/journal.pone.0205929
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0205929

Under-Citation **Stifles Scientific Innovation**

Active Inclusion is the Solution



NSF Merit Review Criteria

Reviewers will be asked to evaluate all proposals against **two** criteria:

Intellectual Merit:

The Intellectual Merit criterion encompasses the potential to advance knowledge;

How important is the proposed activity to advancing knowledge within its own field or across different fields? And...

Broader Impacts:

The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes

How well does the proposed activity benefit society or advance desired societal outcomes?

Additional Review Criteria for GRFP

Applicants are reviewed on their **demonstrated potential** to advance knowledge and to make significant research achievements and contributions to their fields throughout their careers. Reviewers are asked to assess applications using a **holistic, comprehensive** approach, giving balanced consideration to all components of the application, including the educational and research record, leadership, outreach, service activities, and future plans, as well as individual competencies, experiences, and other attributes. The aim is to recruit and retain a **diverse cohort** of early-career individuals with **high potential for future achievements**, contributions, and broader impacts in STEM and STEM education.

What is the review process?

- Each panelist reviews ~15-25 applications
- Each application is reviewed by three panelists.
- For each application, each panelist provides:
  - Written comments on IM and BI, and a summary statement
  - An overall numeric ranking
- Online, video discussions: Panelists review the rankings, identify differences of opinions about individual applications
- Panelists make recommendations of awards to NSF
- NSF reviews and makes awards and honorable mentions

Insight on review process?

- Consider “evaluator fatigue”…
- Well-written, memorable statements can lead the panelist to ADVOCATE for the applicant during discussions
- Help reviewers identify **Intellectual Merit** and **Broader Impacts** criteria
- Highlight your track record for leadership in activities that support the broader impacts criteria

Broader Impacts Criteria – examples

- International experience
- Publications and presentations
- Mentor, TA, volunteer tutor, etc.
- Science outreach
- ANY volunteer work regardless of field
- Leadership activities
- Interdisciplinary collaboration
- Broad dissemination of scientific understanding
- Showing that you know how to apply your knowledge and skills to the bigger picture.

Intellectual Merit Criteria – examples

- Evidence of intellectual ability and potential to advance knowledge
- GPA (though not reported officially, will be seen in transcripts)
- Rigor of research plan, and potential for scientific leadership in field
- Technical knowledge and skills
- Ability to work collaboratively and independently
- Reference letters

What are YOUR Intellectual Merit & Broader Impacts Activities? Part A and B

- Google Jamboard Link: **https://tinyurl.com/NSFjamboard2022**
- Join Google Jamboard – your Breakout Room number is your Google Jamboard number
- Instructions and example for Breakout Room Jamboard Activities
- Google Jamboard labeled with
  - **Intellectual Merit** | **BOTH IM & BI** | **Broader Impacts**

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California State University
PROGRAM FOR EDUCATION AND RESEARCH IN BIOTECHNOLOGY

What are YOUR Intellectual Merit & Broader Impacts Activities? Part A: You have 15 minutes

- **Meet your Breakout Room colleagues – person who woke up the earliest goes first!**
- **THINK**: Each team member should think about their own experiences – looking backward, currently, and going forward
  - Identify examples of **INTELLECTUAL MERIT** and write them down on their team Jamboard on an IM post-it
  - Identify examples of **BROADER IMPACTS** and write them down on their team Jamboard on a BI post-it
  - Each team member should generate at least three post-its.
- **SHARE:** Team members share what they have written on their post-its. Provide feedback on whether they are in the correct category OR whether they meet BOTH IM & BI.
- **SORT:** Each team member reviews/updates their IM/BI examples on the IM, BI, or IM&BI post-its to generate their final Jamboard.

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Download instructions from the chat!

What are YOUR Intellectual Merit & Broader Impacts Activities?
Part B: You have 10 minutes

- **PART B: Carousel Graffiti**
  - Each team will move to the "next" Jamboard frame for ~5 minutes and write comments (GRAFFITI!) on that team's Jamboard (Team 2 goes to Jamboard 3,… Team 20 goes to Jamboard 1)
    - Teams may contribute multiple thoughts per Jamboard (you add text boxes or use the pen).
    - Do you agree? Disagree? Are you confused? Ask a question!

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California State University
PROGRAM FOR EDUCATION AND RESEARCH IN BIOTECHNOLOGY

What are YOUR Intellectual Merit & Broader Impacts Activities?
Part B - You have 10 minutes

- **PART B: Carousel Graffiti**
  - Return to your original Jamboard frame.
  - Review the comments, suggestions from your colleagues!
  - Back in the Main session, be prepared to share out your own questions or observations!

Please complete our post workshop survey:
https://sfsu.co1.qualtrics.com/jfe/form/SV_8oY7YrzEkanBPKu

How to get from here to there: Graduate school writing workshop Part I

NSF Graduate Research Fellowship Program: Writing Your First Grant Application!

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Koni Stone, Stan State
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CSUPERB Symposium 2022

CSUPERB Writing Workshop, Part 2

How to get from here to there:
Graduate school writing workshop

Friday, 1:00 –2:00 pm

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Project Management*

- How to make things happen
- Making good decisions
- Figuring out what is required
- Ideas and what to do with them
- How not to annoy people
- Leadership and trust
- Making deadlines
- What to do when things go wrong

from Scott Berkun,* ***Making Things Happen: Mastering Project Management*

Research on adult learning indicates four essential principles of success:

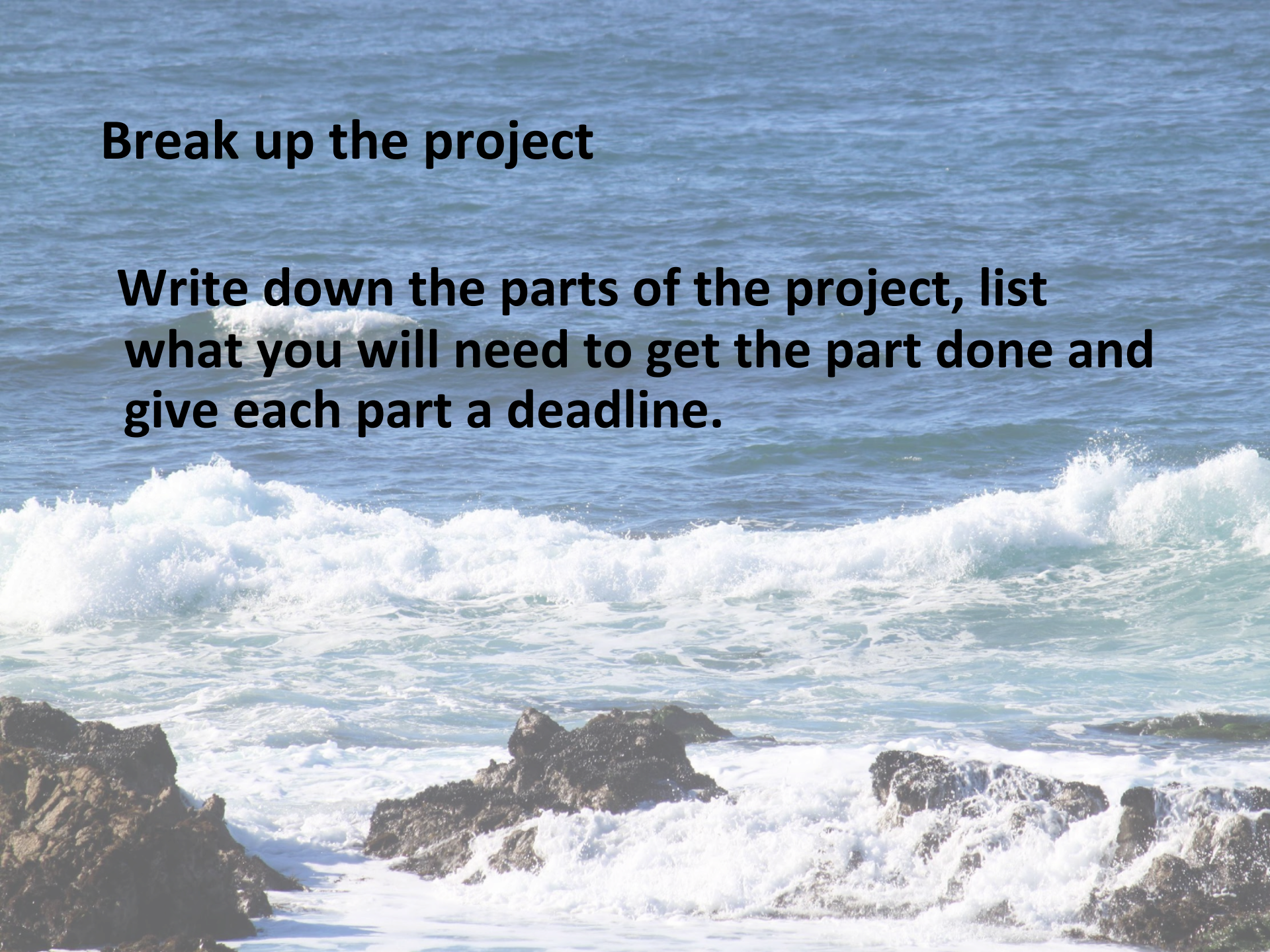
1. Active involvement (doing the work)
2. Effective use of resources
3. Social interaction/ collaboration
4. Self-reflection (or self-assessment) – see three points above!

Project: Writing a Grant, Applying for Jobs, Applying to Grad School/ Med School/ Professional School

The assignment planning and tracking tool that you can use is based on project development plan (PDP).

Writing down the plan is a forcing function-with key features:

- The work (requirements)
- The skills needed
- The support required
- The time line



Break up the project

Write down the parts of the project, list what you will need to get the part done and give each part a deadline.

Project Development Plan

Goal	Deadline	Specific Skills needed	Strategies needed to build skills
Complete application: • Research plan • Personal Statement • Transcripts • Letters of Recommendation	October	Develop a research plan: • Ask a question. Find relevant literature. • Understand the experiments that generated the data, • Propose new experiments • Effectively communicate understanding in writing	• Meet with instructor to discuss research ideas and previous experiments. • Give a rough draft to a professor for feedback. • Set deadlines for interim goals. • Students and faculty meet deadlines.

Strategies for your next big writing assignment.

- Break it up into manageable steps, write down reasonable deadlines.
  - Reasonable for you to complete,
  - Reasonable for you get support/ feedback before it is due.
- Assess your skills/information—what do you need before you can start and complete each step?
- Start the project and stay on course.

Applying for a GRFP

Part	Due date
Approach faculty member(s) to enlist them as reviewer(s) of your personal statements and research plan. You need a mentor (or two) for this project.	February 10th
Brainstorm about areas of research that you want to do, read the literature and discuss your ideas with your research advisor, lab mates, friends, family, pets. You need an original idea of your own.	Month of February
Take your rough idea of research area and propose a hypothesis. Share this with your research advisor.	March 1
Read the literature on this topic. Use notecards to summarize what has been learned from each journal article.	Month of March
Personal Statement version 1.0 ready for someone (Advisor, other professor, Writing Center Staff etc.) to read.	April 20
Approach Reference Letter Writers, give them information about the GRFP.	May 10th
Use the summer to polish your personal statement and to write your research plan. Deliver your Personal Statement 2.0 for wider review, give your research plan to your research advisor.	August 20th
Review your Academic Transcripts: make sure nothing will prevent their release. Remind your Letter of Reference writers of the October deadline.	August 20th
Meet with your research advisor to discuss your research plan, use feedback to improve your research plan. Schedule weekly meetings as you refine your proposal.	September 15

Sit back, relax and enjoy the view!

Letters of Recommendation

1. You control this process
2. Faculty want to write strong letters
3. Help faculty write strong letters that have specific details.
    - Ask early (Months before you need the letter)
    - Remind them what you did in their class
    - Provide a list of information that you want highlighted in the recommendation letter. (e.g. Accomplishments, goals, examples of persistence)
    - Provide reminders several weeks before, as the deadline approaches check to see if the letters have been submitted.

http://biochemistry-stanislaus.wdfiles.com/local--files/start/LORform

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Full Name: **Today's Date**:

Use of Letters (check appropriate uses)

_____ Graduate School (*write in program type here – degree and discipline*)

_____ Health Professions – Primary (*write in program type here*)

_____ Health Professions – Supplemental (*write in program type here*)

_____ Internship/Summer Research (*write in discipline here*)

_____ Employment _____Scholarship

_____ Study Abroad _____ Other (*write in use here*)

Other References (List all of the people whom you have asked to write a letter of recommendation, to help avoid duplication of information across the letters.)

Academic Background

Academic Advisor:

Expected year of graduation:

Major: Minor:

List of Relevant Courses Completed for your application (e.g., if you are applying to a biological conservation non-profit internship, list ES/BISC courses; if you are applying to dental school, list BISC/BIOC/CHEM courses, etc.). If it's easier, you can attach an unofficial transcript:

Course Number	Course Name	Fall or Spring & Year	Grade

Overall GPA: _____ Major GPA: _____

Courses Taken From Me:

Course Name	Fall or Spring / Year	Grade

Independent Research Project/Senior Thesis (if applicable)

Research Advisor:

Research Title:

Summer Research/Internship Experiences (indicate when and where the internship was conducted and a sentence describing the focus of your project/job)

Previous Employment: (list all summer, full time, and college employment *since graduation from high school*. Also include any work-study positions that you held during the school year).

Position	Year	Responsibilities

Honors and Awards:

Membership in Organizations and Extracurricular Activities: (please note leadership positions)

Personal Statements

Adapted from Materials developed by Nancy Au, MFA
www.peascarrots.com
https://www.peascarrots.com/spider-love-song/spider-love-song

nau@csustan.edu

Literary Terminology:

Writing constraints: we will give you directions to constrain (focus) your writing.

Free writes: write whatever comes to mind, do not worry about grammar, syntax, organization. Just get the ideas on the page.

Timed writing: you have one minute for each topic. No time to ponder, just write.

Writing Experiment #1

A Portrait

Draw a portrait of a special person in your life...

Consider:

someone you think about often, or

someone who your Science could impact, or

someone who has inspired you to pursue Science

Personal Statement Essay Prompt (NSF)

What examples of leadership skills and unique characteristics do you bring to your chosen field?

Writing Experiment #2
“Mad Transports”

Describe a moment from your life that you are most proud of, a time you might return to over and over in your mind.

Consider: a time when you stood up for yourself or others, or a time when you surprised yourself, or a time when you did something you didn’t think you could...

Personal Statement Essay Prompt (NSF)

Describe your personal, educational and/or professional experiences that motivate your decision to pursue advanced study in science, technology, engineering or mathematics (STEM).”

Consider: “Why are you fascinated by your research area?”

Writing Experiment #3: *Catalysts*

Write *into* your First Time with Science.

Literary Terminology:

Defamiliarization, sensory detail

Personal Statement Essay Prompt (NSF)

"Include specific examples of any research and/or professional activities in which you have participated.

Present a concise description of the activities, highlight the results and discuss how these activities have prepared you to seek a graduate degree."

Writing Experiment #4
Hauntings

What is one thing that haunts you about one of your scientific endeavors? This haunting might be a lingering question or a specific moment or an interaction with a colleague or a research subject, etc.

Consider: Imagine the loved one that you drew in the first exercise. Imagine how this question (and science) will impact them? Does this haunt you? If so, how and why?

Personal Statement Essay Prompt (NSF)

"Describe the contributions of your activity to advancing knowledge in STEM fields as well as the potential for broader societal impacts.”

Writing Experiment #5
Conduits

1. Describe the most memorable moments during one of your science jobs, or volunteer positions, or internships, or mentorships, or teaching a sibling (or someone) about the science of bees (or or or…).

   Experiment: Use sensory detail. For example, where was the light coming from? What was the temperature in the air? Were your fingers tingling, your heart pounding? etc.

2. How do you see yourself as a conduit between your science and the rest of the world?

   Experiment: Imagine speaking to your favorite grandparent or younger sibling or cousin. Tell them **why** you are doing this important work. Tell them **how** it will impact their lives.

Personal Statement Essay Prompt (NSF)

"What personal and individual strengths do you have that make you a qualified applicant?"

Writing Experiment #6
Resilience & Voice

Describe a difficult time at school or at work or at home when you needed help.

Consider:

What did you do?

Who did you reach out to?

What was the outcome?

Writing Experiment #7
Mother Tongues

Describe a time when you felt like you were straddling two different worlds.

Consider: Why? Who populated these two spheres? What was the source/cause of the tension? Was there a cultural or linguistic or generational or personal belief system at the root of the conflict?

"The Science of Scientific Writing" by Gopen and Swan

“If the reader is to grasp what the writer means, the writer must understand what the reader needs.”

George D. Gopen & Judith A. Swan

https://cseweb.ucsd.edu/~swanson/papers/science-of-writing.pdf

The Science of Scientific Writing

1. Long distance relationships are difficult. Don't make the subject pine for its verb, keep them close.

2. If it is important, put it at the end.

The Science of Scientific Writing

The last thing that is read, is remembered the most.

Use the stress position to make your point.

Start with basic information and then build up to the most important content.

Start a meal with a basic salad, add some protein (nourishing facts) and end with dessert!

Stressed is Desserts spelled backwards

Links to resources

- Form to use for Letters of Recommendation Information: http://biochemistry-stanislaus.wdfiles.com/local--files/start/LORform

- Writing exercises:

http://biochemistry-stanislaus.wdfiles.com/local--files/start/CSUPERB%20writing%20workshop%202022.pdf

- Slides:

http://biochemistry-stanislaus.wikidot.com/start