# Your proposal assignment

**Grading:**

- **20%:** A proposal as if it were prepared for submission to the NSF Graduate Research Fellowship Program Program (CISE field of study).
  This research proposal should be developed in consultation with an appropriate faculty member, and should focus on a Computational Thinking approach to a research question (http://www.nsfgrfp.org/). We will cover the general requirements and details of this proposal throughout the semester.
- **10%:** proposal presentation/pitch to class at end of semester, each about 5 minutes
- **Total: 30%**

**Deadlines:**

- *Proposal*: December 15th, before midnight!
- *Pitch Presentations*: December 13th (finals Week)!



Big thanks to Peter Todd & Johan Bollen who provided lots of material for these slides!

# NSF Graduate Research Fellowship Program (GRFP) 2017

“The purpose of the NSF Graduate Research Fellowship Program (GRFP) is to help ensure the vitality and diversity of the scientific and engineering workforce of the United States. The program recognizes and supports outstanding graduate students who are pursuing research-based master's and doctoral degrees in science, technology, engineering, and mathematics (STEM) or in STEM education. The GRFP provides three years of support for the graduate education of individuals who have demonstrated their potential for significant research achievements in STEM or STEM education. NSF especially encourages women, members of underrepresented minority groups, persons with disabilities, veterans, and undergraduate seniors to apply.”


**http://www.nsfgrfp.org/**

# Official solicitation

- https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf16588

# Elligibility

Confirmation of acceptance in a graduate degree program in science or engineering is required at the time of Fellowship acceptance, no later than May 1 of the year the award is accepted. Prospective Fellows must enroll in a university, college, or non-profit academic institution of higher education accredited in, and having a campus located 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 year the award is accepted. All Fellows from the date of Acceptance through Completion or Termination of the Fellowship must be affiliated with a graduate degree-granting institution accredited in, and having a campus located in, the United States, its territories, or possessions, or the Commonwealth of Puerto Rico.

**NOT Eligible**:

- Non-US citizens
- Previous awardees
- Completed the requirements for any graduate or professional degree by August 1, 2017
- NSF employees

**Number of Times individuals may apply:**

- As graduate students: **ONE APPLICATION!**

(new 2017 rule!)

**In 501: EVERYONE**

# When?

Official deadlines are October 23, 24, 26, and 27 respectively for (1) Geosciences, Life Sciences, (2) CISE/Engineering/Materials Research, (3) Psychology; Social Sciences; STEM Education and Learning, and (4) Chemistry; Mathematical Sciences; Physics and Astronomy

- But for purposes of this course exercise, your

**deadline is December 15th before midnight!**

# How does it work?

**NSF wants:**

1. Personal information, Education, work and other experiences
2. Reference letters
3. Academic Transcripts
4. Personal, Relevant Background & Future Goals Statement (**max 3p**)
5. Graduate Research Plan Statement (**max 2p**)

**We want:**

- Items 4 & 5, i.e. a total of 5 pages = 20% of grade
- A 5' in-class elevator-pitch presentation (December 13$^{th}$) = 10% of grade

Total 30% of grade.

# Formatting

4. Personal, Relevant Background & Future Goals Statement (**max 3p**)
5. Graduate Research Plan Statement (**max 2p**)

***"These page limits include all references, citations, charts, figures, images, and lists of publications and presentations."***

- Standard 8.5" x 11" page size
- 12-point, Times New Roman font or Computer Modem (LaTeX) font
- 10-point font may be used for references, footnotes, figure captions and text within figures
- 1" margins on all sides
- Single spaced (approximately 5 lines per inch) or greater line spacing. Applicants should not use line spacing options such as "exactly 12 point," that are less than single spaced.

# 4. Personal, Relevant Background & Future Goals Statement (3p)

- Please outline your educational and professional development plans and career goals. How do you envision graduate school preparing you for a career that **allows you to contribute to expanding scientific understanding as well as broadly benefit society**?

https://www.nsfgrfp.org/applicants/application_components

# 4. Personal, Relevant Background & Future Goals Statement (3p)

**Questions:**

1. Why are you fascinated by your research area?
2. What examples of leadership skills and unique characteristics do you bring to your chosen field?
3. What personal and individual strengths do you have that make you a qualified applicant?
4. How will receiving the fellowship contribute to your career goals?
5. What are all of your applicable experiences?
6. For each experience, what were the key questions, methodology, findings, and conclusions?
7. Did you work in a team and/or independently?
8. How did you assist in the analysis of results?
9. Explicit: How did your activities address the Intellectual Merit and Broader Impacts criteria?

# 4. Personal, Relevant Background & Future Goals Statement (3p)

**Distribution**

- Recommendation:
- 1.25p personal statement, your story
- 1.25p relevant background
- 0.5p future goals

# 5. Graduate Research Statement (2p)

Present an original research topic that you would like to pursue in graduate school. Describe the research idea, your general approach, as well as any unique resources that may be needed for accomplishing the research goal (i.e., access to national facilities or collections, collaborations, overseas work, etc.)

You may choose to include important literature citations.

Address the **potential of the research to advance knowledge and understanding within science as well as the potential for broader impacts on society**.

# 5. Graduate Research Statement (2p)

**Important questions to ask yourself before writing the statement:**

1. What issues in the scientific community are you most passionate about?
2. Do you possess the technical knowledge and skills necessary for conducting this work, or will you have sufficient mentoring and training to complete the study?
3. Is this plan feasible for the allotted time and institutional resources?
4. How will your research contribute to the "big picture" outside the academic context?
5. How can you draft a plan using the guidelines presented in the essay instructions?
6. **How does your proposed research address the Intellectual Merit and Broader Impacts criteria?**

**Scientific Merit and Broader Impact MUST BE MENTIONED EXPLICITLY!**

# Review criteria

"The **Intellectual Merit** criterion encompasses the potential to advance knowledge."

For example: the potential of the applicant to advance knowledge based on a holistic analysis of the complete application, including the Personal, Relevant Background, and Future Goals Statement, Graduate Research Plan Statement, strength of the academic record, description of previous research experience or publication/presentations, and references.

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

For example: the potential of the applicant for future broader impacts as indicated by personal experiences, professional experiences, educational experiences and future plans.



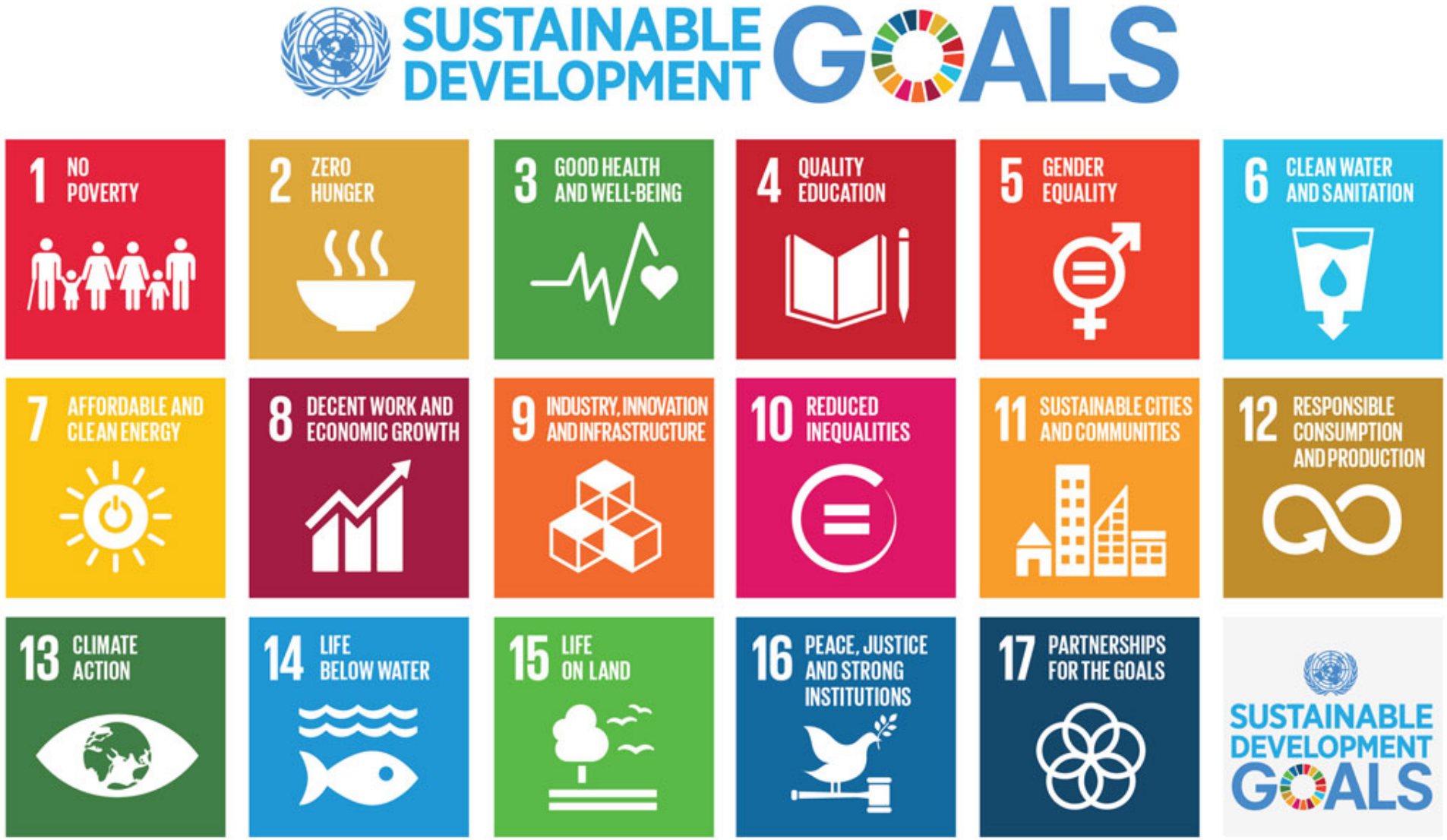
https://www.nsfgrfp.org/applicants/application_components/merit_review_criteria

# More on Broader Impact

"Such outcomes include, but are not limited to: full participation of women, persons with disabilities, and underrepresented minorities in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the US; and enhanced infrastructure for research and education."



http://www.nsfgrfp.org/how_to_apply/review_criteria


SUSTAINABLE DEVELOPMENT GOALS
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS
SUSTAINABLE DEVELOPMENT GOALS

# General words of wisdom: Personal statement

Describe **your** past and current research experiences (and plan for courses in future)

Make sure to communicate more than a timeline—how were **you** engaged in what you did? What did you DO?

What did **you** get out of it?

Even if you were just doing something like data entry, describe how **you** were reflecting on the research and learning from it (what were the lab's questions?)

Indicate all the different techniques **you**'ve learned in past research experience (even if not using them in proposed project)

Note how I marked you? Be persuasive. Show exactly how you contributed, how it made things better for your group, how you exhibited leadership, how you made things happen, and how it contributed to your experience and capabilities as future STEM leader.

# Top tips from awardees

1. Start early, taking significant time to compose essays, and rewrite.
2. Demonstrate your personal motivation and excitement for research.
3. Spend time to thoroughly research your topic.
4. Integrate essays to create singular theme, link the content together.
5. Keep essays clear and simple to read.
6. Give essays to many people for review.
7. Get input from professors or university administration.
8. Get input from previous applicants or winners.
9. Thoroughly address both Intellectual Merit and Broader Impacts.
10. Be sure to include all volunteer, leadership, and extracurricular activities.
11. Highlight the significance of your research and how it will impact society.
12. Pay close attention to language in the Program Solicitation.
13. Focus on getting strong recommendation letters.
14. Mention what sets you apart from a typical applicant -- **be unique**!

# Top tips from awardees

1. Write clear and scientifically-sound essays.
2. Be sure to demonstrate the Broader Impacts criteria well.
3. Link your teaching and research experiences.
4. Ensure you display a history of accomplishments.
5. Thoroughly address both Intellectual Merit and Broader Impacts.
6. Highlight any international experience you may have.
7. Display your passion and motivation in the essays.
8. Be knowledgeable of your research topic.
9. Demonstrate the significance of your proposed work.
10. Make sure the proposed research is realistic.

# General words of wisdom (jbollen)

You need to mind the formal criteria/check lists etc but what really matters:

- Don’t so much focus on the task or burden of writing a proposal, but on the pleasure of outlining an interesting, relevant and successful research agenda.
- You are asking for support ($$$). Someone will make a decision to support your research. They need to a see compelling reason to do so. Your essay must make a good scientific and societal case for why one should invest in your idea and professional development.
- Make clear that you are qualified and well-positioned to execute the proposal.
- Start with the big issues. The limit is 2 pages, so try to be as succinct and to the point as you can. Focus on the **why**, then on the **how**.
- Quality of exposition matters. Don’t annoy reviewers with jargon, crummy grammar, overly long sentences, non sequiturs.
- Plain English! Avoid fancy-schmancy deepities, think about what your words really mean.
- Be mindful of your **audience**. Your reviewers will be experts but not the degree that you may be.

# Meredith West's patented "8-paragraph formula":

1. First and last paragraphs are similar: intellectual merits of your project—why is it important?
   - *lay out a specific statement of what you want to do and why it's important -- keep it concise (one breath) -- this should be the first sentence of your proposal*
   - *include a LITTLE bit of literature*
2. More local to the particular problem you're studying
   - introduce the puzzle/question/whatever that underlies your research question—why are you studying this question in particular?
3. Flexible—more about why this question is important to you and/or more literature background
4. Literature background—recent research relative to what you're doing

# Meredith West's patented "8-paragraph formula":

5. Nuts and bolts of your first activity/experiment
   - up to this point you pretty much have the first year lined out
6. What's your hypothesis?
   - also important to consider what the next step is if you're wrong
7. (and maybe part of 6.) The final 2 years—what comes next?
   - what are the follow-up questions/studies for years 2 and 3?
   - why do you need the NSF fellowship (especially after IGERT)?
   - travel? need to learn new methods? longitudinal research? etc.
8. Back to the big picture:
   - how is your proposal going to make an impact in your field?
   - broader impacts again! (possibly as a separate paragraph)

Then, include references, but in abbreviated format (e.g., all run together with semicolons between them, 10 pt type)

# EXAMPLES..

# Examples;

- http://www.alexhunterlang.com/nsf-fellowship#TOC-Examples-of-Successful-Essays