Outline

- Research grant system
- The research proposal
- Research publication system
- Research manuscripts
Research grant system
Funding for research

- Intramural
- Extramural
  - Government (local, state & federal)
    - National Institutes of Health (NIH)
    - National Science Foundation (NSF)
    - US Dept. of Agriculture (USDA)
    - US Dept of Energy (DOE)
  - Private foundations
    - Howard Hughes Medical Institute
    - Bill and Melinda Gates Foundation
Funding for graduate students

- NSF Graduate Research Fellowship (i.e. Predoctoral Fellowship) (www.nsf.gov/grfp).
  - 3 years ($40.5k)

  - 2-5 years

- Ford Foundation (http://sites.nationalacademies.org/PGA/FordFellowships/index.htm)
Trajectory of a proposal

- Submission
- Initial review for compliance
- Program officer assigns reviewers (ad hoc and panel members)
- Panel meets, reads over reviews and discusses merits of proposal. Score or recommendation given.
- Decision is made to fund or not fund.
Research proposal
Components of a proposal

- Project summary (abstract)
- Project description
- Budget and Budget justification
- Other documents:
  - Biographical sketch
  - Letters of support
  - Resources available
What reviewers look for

- Does it thematically fit the agency/program?
- Are the questions asked important to the field?
- Is the project likely to succeed?
- Can the questions be answered by the experiments?
- Experimental flaws?
- Overambitious?
- Is there a plan to analyze and interpret results?
  Contingency plans?
- Do the PIs (Principal Investigators) involved have the capacity to perform the project?
Abstract of the research proposal (usually a page)

What are the main questions the proposal is set to answer.

Very briefly, how are these questions going to be answered (i.e. what experiments are planned).

How do the answers to the proposal questions fit in the larger context of the field? How does it relate to the big picture?
Project description

- Introduction
- Preliminary work
- Project design
- Expected results and implications

Other sections:
- Broader impacts
- Mentoring plan
Introduction

- What are the overarching questions in the field.
- What are some of the resolved or studied components of the big question.
- What still needs to be resolved.
- What aspects of the study system facilitates the study of unresolved components. (introduction to the study system).
Preliminary work

- This is a the place you show the reviewers that you have the ability to perform the experiments.
- Show a track-record of working in the field.
- Could be published work or unpublished pilot data.
Project design

- The main component of the proposal.

- How are you going to experimentally test and try to answer the specific questions you raised in the introduction.

- Do not need to list every little detail, enough for the reviewer to understand the experiments and to assess your proficiency in the field.
Expected results & implications

- This section can also be incorporated into the Project Design.
- Here is where you show the reviewer that you thought about the possible results.
- How are you going to analyze the data?
- If you get X what does it mean with respects to the specific question? What if you get Y?
Guide to proposal success

Read the instructions several times and very carefully.

Give yourself a “deadline” two weeks before true deadline.

Have it read by colleagues/friends in your field and in other fields.

Do not take rejection personal. The great majority of proposals do not get funded the first time.
Research publication system
Publishing your work

- Research which journal would be a better fit for your manuscript (Impact Score).
- Submit your manuscript (electronically).
- Submit cover letter which briefly summarizes the merits of the manuscript and list suggested reviewers (very important).
- Associated editor (AE) will send your paper out to between ~2-4 investigators.
- Once reviews come back AE will make decision.
Research manuscripts
Components of manuscript

- Abstract
- Introduction
- Materials and Methods
- Results
- Discussion
- References
- Figures, Figure Legends and Tables
- Supplementary information
Abstract

- Short summary between ~200-400 words (depends on journal).
- Sentence or two relating to background and questions.
- ~2-3 sentences on experimental design and description of system.
- ~2-4 sentences on results and study conclusions.
Introduction

Similar to the proposal introduction, but little bit more narrow in scope.

What are the overarching questions in the field.

What are some of the resolved or studied components of the big question.

What needs to be resolved and your hypothesis.

Introduction to the study system.
Material and Methods

- A good amount of detail, enough that anybody could repeat experiments and analysis.
- Do not need to add every little detail. (e.g. primer concentration in the PCR, unless an “abnormal” amount is used)
- Statistical analysis plan.
Results

- Observed results and statistical analysis.
- Just state what you observed and/or analyzed without any interpretation.
- A good example: “Wing length was significantly greater (t-Test, \( P<0.02 \)) in the northern population relative to the south.”
- A no so good example: “…likely do to the low resources available, northern population exhibited larger wings.”
Discussion

- Interpretation of results. What is the data saying?
- How do the results fit or don’t fit previous studies and your hypothesis (from intro).
- How do the results of this study fit into the context of the big picture, implication of results.
- Future directions
Other material

- References: Use Endnote or similar software. Easy to download references (WebofScience) and change formatting.

- Figures and tables used should be necessary for the clear understanding of the results and/or analysis.

- Extra information (figures, tables, etc) that are not essential for the understanding of the manuscript, but should be present for completeness are placed in Supplementary Information.
Helpful suggestions

- Read both primary literature and reviews.
- Always credit ideas and work to rightful author(s).
- Be clear in your writing and have it read by several friends/colleagues.
- Always keep the reader in mind.
- Look at what has been published in the chosen journal (for style and emphasis).
- Color figures are nice, but $$$$.
Questions