Science Writing:

- includes reporting science (papers), grant proposals, oral presentations, posters, review papers

- 10-20k peer reviewed science journals currently published

- need for clarity and conciseness so that message is received and understood

- organization is required
IMRAD

Introduction - What question was studied?

Method - How was the study conducted?

Results - What were the findings?

and

Discussion - What do the findings mean?
Importance of the title - may be read by thousands of people (unlike most papers)

- need fewest possible words adequately describing content of paper

- use as a label not an abstract

- be specific enough

- get the syntax right
Abstract

Miniature version of the paper - a summary of the information in each section

- objectives and scope
- describe methods
- summarize results
- state principal conclusions
Writing Issues

Establishing the mindset

Think about effective tables and figures

Writing clearly - think about things from the readers perspective
Gopen & Swan (1990), The Science of Scientific Writing, American Scientist, 78, 550-558
The vanity press

Nature’s criteria for publication:

• Provides strong evidence for its conclusions.
• Novel (we do not consider meeting report abstracts and preprints on community servers to compromise novelty).
• Of extreme importance to scientists in the specific field.
• Ideally, interesting to researchers in other related disciplines.

Science:

• Research papers sent to Science should be novel findings at the forefront of their fields, with broad scientific implications, written concisely and engagingly.
Sharing results:

There is an obligation to publish - someone is paying you to do research with the assumption that you will share your results. Value of data is lost when results are not communicated.

If you publish an analysis of a data set, it is nice to make the data available so others can reproduce your work - some funding agencies require this.

Code is tricky. Personally, we don’t like to read papers on results from running code that is not publicly available. But, the University may hold copyright and want to license code to generate revenue. A balance may be to distinguish between academic and commercial use.
Abuses in writing papers

LPUs - Least publishable unit
Double dipping
Multiple simultaneous submissions
Inappropriate authorships
What does “in press” mean?
Preparing NSF Proposals

http://nsf.gov/funding/preparing/
Parts of an NSF proposal:

- Information about PIs
  - Suggested reviewers (optional)
- a. Cover sheet and Certification Page
- b. Project Summary (1 page)
- c. Table of Contents (generated by Fastlane)
- d. Project Description (15 pages)
- e. References
- f. Biographical Sketch(es) (2 pages each)
- g. Budget (each year plus totals)
  - Budget Justification (3 pages)
- h. Current and Pending Support
- i. Facilities, Equipment, other Resources
- j. Supplementary Documentation:
  - Postdoc Mentoring Plan (1 page)
  - Data Management Plan (2 pages)
  - Letters of commitment from collaborators
  - UNOLS ship time request form
Both the Summary and Description must explicitly cover “intellectual merit” and “broader impacts”:

What is the intellectual merit of the proposed activity?

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of prior work.) To what extent does the proposed activity suggest and explore creative, original, or potentially transformative concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity?

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?
Proposals must be associated with a program announcement from NSF. Programs have either a target date or a deadline. Examples:

- Marine Geology and Geophysics, target dates Feb. 15 and August 15
- Physical Oceanography, target dates Feb. 15 and August 15
- Geophysics, deadlines June 5 and Dec. 5
- CSEDl, deadline Sept 25
- MARGINS, deadline July 1
- Earthscope, deadline July 16
- Petrology and Geochemistry, deadlines July 6 and Dec. 6
- Earth Science Instrumentation and Facilities, target dates second Wed. in Feb., third Monday in July
Flow of a proposal through the system:

- Institutional paperwork
- NSF Fastlane
- NSF Program
- Program Manager
- NSF Panel
- ~6 reviewers

You

Collaborators at other institutions

Collaborator’s C&G

Proposals linked by lead inst.