

PTYS 495B: Scientific Writing for the Physical Sciences

Kuiper Space Sciences Building Room 330, 11 am MWF

Instructor: Lynn Carter, lmcarter@arizona.edu

Office Hours: Kuiper 533A, TBD

Required Textbook: Joshua Schimel, “Writing Science: How to write papers that get cited and proposals that get funded”, Oxford University Press, 2012.

Course Description: As scientists, we are all professional writers. Writing clear and compelling text is extremely important for describing our work to others, participating in the scientific exchange of ideas, and winning fellowships and proposals. This course will introduce undergraduate physical sciences majors to writing a scientific journal article, and they will work to write and revise different sections during the course. Students will be encouraged to write about their own research, especially if they and their research advisor have discussed publishing results. Students can also choose to write a review article of the style found in an “annual reviews” journal.

Mondays and Wednesdays will be lecture/discussion days, including some in-class reading, reviewing and commenting. Fridays will be workshop days, some of which will be free writing time where students can practice writing in timed, scheduled blocks. The course will draw examples from the textbook as well as journals such as Science, Nature, and journals in geosciences, planetary sciences, astronomy, and astrophysics. Students will review published examples, as well as provide feedback to other students through peer review. Most assignments are related to drafting the paper, and students will have multiple opportunities for revising their work before submitting it at the end of the semester.

Course Learning Objectives: During this course we will discuss how to write, edit, and publish a scientific paper, and we will also briefly discuss some other types of science writing such as proposals and short blog entries for the public. Topics will include:

- The logistics of publishing a paper, and the different types of scientific papers and their goals.
- The structure of scientific papers, and how structure contributes to producing clear and interesting writing.
- How to write different sections of a scientific paper, including what material goes into each section and how to decide on the detail level and order of topics.
- Production of figures and tables, making accessible figures, and the importance of descriptive captions.
- Editing, including revising for structure, clarity and flow, word use, and removing unnecessary jargon.
- How to peer review a paper, and how to respond to reviewer comments.
- The differences between writing a proposal and writing a scientific paper.
- Ethics in publishing, dealing with uncertainties in your data, and co-authorship.
- Telling the public about your new paper.
- Other types of science writing as an undergraduate: fellowship/scholarship writing and grad applications.

Course Learning Outcomes: Upon completion of this course, students will be able to:

- Describe the parts of a typical scientific paper, different types of journals, and how to publish their work.
- Write drafts of paper sections such as the introduction, methods, discussion and conclusions that contain the information needed to understand a science experiment, research project, or topic review.
- Describe and provide examples of how storytelling and structure contribute to clarity and reader interest.
- Critically review papers in the literature and those written by their peers.
- Edit their own work and that of others, specifically including editing of structure, clarity, and language.

Grading Scale and Policies

The course components will have the following weights:

Course Assignments	25%
Friday Workshop Assignments	20%
In-class participation	15%
Final Paper	40%
Total:	100%

This class uses standard ABCDE grades. Final letter grades will be assigned as follows:

- A: 90% or higher
- B: 80 – 89%
- C: 70 – 79%
- D: 60 – 69%
- E: Below 60%

Absence and Class Participation Policy

Please let me know if you will need to miss class. Participation is part of the final grade and will be assessed based on attending class most days and on active participation during class.

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at: <http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop>

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable, <http://policy.arizona.edu/human-resources/religious-accommodation-policy>.

Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored. See: <https://deanofstudents.arizona.edu/absences>

Final Paper

There will be no final exam. Instead, the final project will be a paper potentially suitable for publication in a scientific journal. This paper may be based on the student's own scientific research, or it can be a review paper summarizing a particular topic. The length should be at least ~2000 words, but is negotiable based on the student's target journal and topic. The paper will be

written and edited in stages throughout the course, and include revisions based on instructor and student peer review. The final paper is due on the last day of class.

University Policies:

All other university policies related to a syllabus are available at:
<https://academicaffairs.arizona.edu/syllabus-policies>.

Subject to Change Statement:

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.

Scientific Writing for the Physical Sciences
Course Schedule

Date	Topic	Reading	Assignment due
Jan 12	Introduction to scientific writing and publishing		
Jan 14	Reading technical articles		W1: Reading technical articles
Jan 17	MLK Holiday		
Jan 19	Citations/reference management/search		A1: Paper proposal due
Jan 21	Assessing article structures		W2: Evaluating different published article structures
Jan 24	Science storytelling – getting the reader’s attention	Chapters 2-3	
Jan 26	Story structures for science	Chapters 4-5	
Jan 28	Free writing, outline discussion		
Jan 31	Action – the middle parts of science storytelling	Chapter 8	A2: Paper outline due
Feb 2	Writing about scientific methods		
Feb 4	Free writing		
Feb 7	Figures/tables/captions 1		A3: Methods draft
Feb 9	Figures/tables/captions 2		
Feb 11	What makes good figures/captions?		W3: Evaluating published figures
Feb 14	Writing the analysis/discussion sections		
Feb 16	Editing the discussion content – when to speculate and when to stop		
Feb 18	Free writing		
Feb 21	The Opening: What makes a good Introduction?	Chapters 5-6	A4: Discussion/Analysis rough draft
Feb 23	Presenting the challenge: laying out questions and hypotheses	Chapter 7	
Feb 25	Free writing		
Feb 28	How to peer review a paper		A5: Introduction draft
Mar 2	Different types of peer review in science		
Mar 4	Peer review practice		W4: Peer review of student introductions and/or samples
Mar 7-11	Spring Break		

Mar 14	Checking and editing a paper's internal structure	Chapter 10	
Mar 16	Writing clear paragraphs	Chapter 11	
Mar 18	Evaluating the structure and storytelling of articles		W5: Published paper internal structure critiques
Mar 21	Conclusions	Chapter 9	
Mar 23	Dealing with data and analysis limitations	Chapter 18	
Mar 25	Free writing		
Mar 28	Sentences and Flow	Chapters 12-13	A6: Complete draft of paper
Mar 30	Energizing writing	Chapter 14	
Apr 1	Editing practice		W6: Editing Worksheet
Apr 4	How to submit your paper, cover letters, formats		
Apr 6	Addressing reviewer comments		A7: Review of papers
Apr 8	Free write/addressing reviewer comments		
Apr 11	Writing proposals		A8: Paper with editing markup
Apr 13	Proposal opportunities for undergrads/grads		
Apr 15	Proposal reviewing – what makes a compelling proposal		W7: Review of sample proposals
Apr 18	Words – removing jargon	Chapter 15	
Apr 20	Condensing	Chapters 16-17	
Apr 22	Free write		
Apr 25	Writing the abstract		
Apr 27	Telling the public		
Apr 29	Writing for the public		W8: Blog entry
May 2	Publication ethics, co-authorship		
May 4	Applying to internships/graduate school		Final paper due

Blue highlights: Friday workshops, (W) assignments due at end of class