

Physics 596. The Art of Writing and Speaking About Physics & Astronomy

This required course is designed for the purpose of teaching you how to write scientific papers and give scientific talks. Following some basic introductory lectures on the elements of scientific writing, grammar, and style, you will be asked to write two papers – both about 4-6 pages in length. In both papers, you should reference all sources and avoid copying them. Outlines will be required with the first paper, which will normally be written on a topic from one of your more advanced physics or astronomy courses. Another possibility is to write about some specific research you have done, but in this case you must be careful to avoid using the jargon of your research group. The specific topic must be accepted by the instructor; elementary topics such as Newton's Laws or the H-R diagram will not normally be allowed. The second paper will be written on a topic chosen from a selection of somewhat more general scientific subjects provided by the instructor. Proper inclusion of equations, tables, and figures will be expected in both papers. The papers will contain at most 2-3 figures and 5-7 equations. The figures and tables should be original or fully referenced. For the two papers, there will be both a draft and a final version. The level of difficulty of the papers should be appropriate for your classmates.

The drafts of the first and second papers will be subjected to thorough review for organization, style, grammar, and scientific lucidity by the instructor. Based on the suggestions, students will revise their papers. Grades will be given for the initial drafts and for the final versions.

In addition to the two papers, you will be asked to prepare talks of approximately 15 minutes' and 25 minutes' duration. The shorter talk will be on the subject of the first paper while the longer talk will be on the subject of the second paper. The lecturer will emphasize some basic principles on the art of giving lucid and interesting scientific talks, and will show you how to utilize visual aids such as PowerPoint slides and transparencies. Following each talk, students will first ask scientific questions, then comment on the strengths and weaknesses of the presentation. The short talks may be videotaped unless students strongly object to the practice. *Students are expected to attend at least 2/3 of the class periods; attendance will be taken.*

The final grades will be determined by the two papers, including drafts and final versions, the two oral presentations, and class participation.

Some Past Topics for First Paper

The Spectrum of the Hydrogen Atom	Stellar Spectra
The Doppler Effect	Stern-Gerlach Experiment
The Bohr Atom	Photoelectric Effect
Compton Effect	He-Ne Laser
Detecting the Ether	Micro-lensing
Born-Oppenheimer Approximation	Twin Paradox
Coriolis Effect	Ising Model

Possible Topics for Second Paper (one topic per person)

The Theory of the Hydrogen Atom: From Bohr to Dirac	Nanoparticles
The Schroedinger Cat Paradox	Magnetic Resonance Imaging
Black Holes	Bose-Einstein Condensation
The Big Bang	Life in the Universe?
Quantum Computation	Dark Matter and Dark Energy
Extra-solar Planets	Slow Light
The History of the Laser	Chaos and Fractals
The Nuclear Shell Model	Holography
The Solar Neutrino Problem Solved	Degenerate Stellar Objects
Quarks	Reaching for Absolute Zero
How Stars and Planets Form	Surface Microscopy
High T_c Superconductivity	The Quark-Gluon Plasma
Why is the Sky Blue?	Supernovae and the Expanding Universe
Optical Traps	Cosmic Background Radiation
Low-Energy Electron Diffraction	New Experiments at CERN
Stochastic Processes	Neural Networks
Nucleation	Quantum dots