

Syllabus: Physics 30 – Science and Pseudo-science

Physics 30, section 1
Tu/Th 10:30 – 11:45

Fall 2018
SQU 325

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Office: 524 Sequoia Hall
Office Hours: M/W/F 1:00 --1:50
also by appointment

Material Covered:

- 1) What is science?
- 2) *Case Study: Astrology*
- 3) Critical Thinking Basics
- 4) Credibility (2 weeks)
- 5) *Case Study: Cold Fusion*
- 6) Rhetoric and Fallacies (3 weeks)
- 7) *Case Study: UFOs*
- 8) Varieties of Argument
- 9) Deductive Arguments (2 weeks)

- 10) Inductive Arguments

- 11) Peer Review in Science
- 12) *Case Study: Dark Matter*

Readings:

- Ben-Ari, Chapters 1, 2, and 3*
Ben-Ari, Chapter 5
Vaughn, Chapter 1, + p. 57 – 63
Vaughn, Chapter 4
Ben-Ari, Chapter 6
Vaughn, Chapter 5
Vaughn, Chapter 10
Vaughn, Chapter 3
Vaughn, Chapters 6, 7, and
Ben-Ari, Chapter 11
Vaughn; Chapter 8, and
Ben-Ari, Chapter 10

to be announced

Case studies will be used to examine arguments for and against each potentially pseudo-scientific idea, using evidence that either supports or weakens the conclusions. More case studies may be added as time permits.

Final Exam: Thursday December 13, 10:15 AM – 12:15 PM

Additional Course Information:

Learning Objectives:

- 1) To learn the basic skills of reasoning, including types and structures of arguments, common fallacies, and critical evaluation of evidence.
- 2) To understand the scientific thinking process.
- 3) To understand the difference between science and pseudoscience.
- 4) To understand the difference between good science and junk science.
- 5) To apply critical thinking skills in contexts such as citizenship, leadership, and as an informed consumer.

GE Area

Physics 30 fulfills the GE Area A3: Critical Thinking requirement.

Required Texts:

Vaughn, Lewis, *The Power of Critical Thinking, 4th Edition*
 Ben-Ari, Moti, *Just A Theory*

Both of these texts are available at the Hornet Bookstore.

Catalog Description:

Examination of the methodology of science. Comparison of legitimate investigations with others that do not meet high scientific standards, including both science poorly done and nonsense passing as science. Examples will be drawn primarily from physical sciences. Analyzes will require study of basic skills of reasoning, types of logical argument, structure and validity of arguments, common reasoning fallacies, critical evaluation of evidence, and understanding of the scientific thinking process.

Grades:

Your final course grades will be based upon 2 exams, 1 final exam, class participation, an essay portfolio and essay evaluations.

Exam 1	15%	
Exam 2	15%	
Class Participation	10%	
Essay Portfolio	20%	Due Dec. 4
Essay Evaluations	20%	
Final Exam:	20%	

Essays will be turned in every other week on Tuesday. **Two copies** must be turned in at that time. One copy will be read by me and returned with comments, and the other will be read by a classmate as an essay evaluation and then returned with their comments. Essays must be no longer than 2 pages, double spaced, in a 12 point font, with 1 inch margins, and they may be shorter as long as you satisfactorily complete the assignment. At the end of the semester you will pick your two best essays, revise them, and turn them in for grading as your essay portfolio.

Essay evaluations will be one page, double spaced, in a 12 point font with 1 inch margins. You will read a classmate's essay and criticize (which means mention both good and bad aspects!!) the critical thinking and reasoning used in the essay. I will grade your evaluations on a credit/no credit basis, if I judge you have made an honest effort in your evaluation. You must be in class on Monday when essays are turned into collect an essay for evaluation. Evaluations are due the following Monday, in between Mondays when essays are due.

Extra credit may be earned by bringing into class examples of psuedo-science being passed off as real science in the popular press. Examples may come from newspapers, magazines, books, etc.... Only printed materials are allowed – no web sites!!! no TV shows!!! no movies!!! The example must be a case where someone is taking the pseudo-science seriously – sarcastic or satiric examples do not qualify. With each example you must submit a one page, double spaced write up in a 12 point font with 1 inch margins. The write up will critically evaluate the pseudoscientific claims being made, pointing out specific weaknesses in the arguments used.

Letter grades will be assigned as follows:

A	$\geq 95\%$
A-	$\geq 90\%$
B+	$\geq 87\%$
B	$\geq 82\%$
B-	$\geq 77\%$
C+	$\geq 73\%$
C	$\geq 69\%$
C-	$\geq 66\%$
D+	$\geq 62\%$
D	$\geq 58\%$
D-	$\geq 55\%$
F	less than 55%

Contacting Me:

The best way is by e-mail, since I don't check my voice mail very often. Coming to office hours is also good, and any time my office door is open, please come in.

Make-up Exams:

I will announce exam dates at least 2 weeks in advance of the exam. If you have a conflicting activity that cannot be rescheduled, *you must see me at least two days before the exam*. If you don't come see me before the exam, there will be no opportunity to make it up. You must bring me documentation of your conflicting activity (i.e. If you have jury duty, show me the form they sent you, if you have a brain transplant scheduled for that day and can't change it, bring me a note from the surgeon, etc....).

Cell Phone Policy:

Please turn your cell phone to vibrate before class starts. Cell phones that ring in the middle of class are disrespectful to your fellow students and to me. If your cell phone goes off in class and it is a call that you must take, please go into the hallway to answer it.

Cheating:

The faculty of the Department of Physics and Astronomy do not tolerate academic dishonesty. Falsification of data, copying, unauthorized collaborations, plagiarism, alteration of graded materials or other actions (as described in, but not necessarily limited to the CSUS Policy Manual) *will be promptly reported to the Office of Student Affairs*. The offending student will be penalized on the assignment in question. Serious infractions will result in course failure and a recommendation for administrative sanctions.

Students with disabilities:

Please see me before the end of the first week of class.