

Elmhurst College

First Year Seminar: FYS-100.09

Becoming a Skeptical Student: Science, Pseudoscience, and Self-deception (<http://www.elmhurst.edu/~earls/fys100>)

Fall Semester, 2010

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Let us endeavor to see things as they are, and then enquire whether we ought to complain. Whether to see life as it is will give us much consolation, I know not; but the consolation which is drawn from truth, if any there be, is solid and durable; that which may be derived from error, must be, like its original, fallacious and fugitive.

-- Samuel Johnson

Be less curious about people and more curious about ideas.

-- Marie (Sklodowska) Curie
Winner of 2 Nobel Prizes

We know very little, and yet it is astonishing that we know so much, and still more astonishing that so little knowledge can give us so much power.

Not to be absolutely certain is, I think, one of the essential things in rationality.

-- Bertrand Russell
1950 Nobel Prize in Literature

FYS COMMON ELEMENTS

These elements are common to all First Year Seminar sections.

1. Liberal Learning: Each section will read and discuss material dealing with the nature of Liberal Arts education.
2. Information Ethics: Each section will participate in a session dealing with the ethical gathering and use of information. Librarians will facilitate this conversation.
3. International Education: Each section will participate in a session dealing with International Education opportunities at Elmhurst College presented by Wally Lagerwey or Alice Niziolek.
4. Four Campus Events: You will be required to attend four campus academic or cultural events and write a brief reflection paper on each.
5. Common Reading: The selected book is *Where Am I Wearing? A Global Tour to the Countries, Factories, and People that Make Our Clothes* by Kelsey Timmerman (John Wiley & Sons, 2009). In addition to discussions of this book during the “Big Questions” Orientation, we will include consideration of material from this book in the course of our section’s activities during the term.
6. Final Paper: The final course project, presentation, and paper will integrate our section course content with insights from FYS common elements.

FYS SECTION TOPIC

About half of the US population believes space aliens who have mastered faster than light flight are visiting Earth; a popular health guru insists that his brand of spiritual healing is firmly grounded in quantum theory; supposedly educated people wear magnets in their shoes to restore their vitality; and credulity ran wild when a sect led by a former race driver claimed to have produced a human clone. All too frequently, people judge a claim of knowledge by how well it agrees with the way they would like the world to be - or fear that it might be. We will examine various examples of the ways that we tend to deceive ourselves and how the processes of modern science and the insights it provides are structured to help us avoid (or at least limit) these tendencies. We will also examine some of the telltale rhetorical devices that practitioners of pseudoscience (and sometimes of plain old fraud) use to encourage these tendencies. In the spirit of liberal education, connections to a wide range of academic disciplines will be highlighted as relevant information is gathered, analyzed, and evaluated.

To see how science is actually practiced, we will try to arrange for students in this class to visit a major research facility – probably Fermi National Accelerator Laboratory. They will also find and evaluate examples of knowledge claims from a variety of sources from outside the classroom. The course will be structured around a series of assigned readings with class discussions, written assignments, in-class presentations, and a class project. No particular science background is required.

RESOURCES

To aid us in these endeavors, a number of selected resources are available.

Texts

Don't Believe Everything You Think: The 6 Basic Mistakes We Make in Thinking by Thomas E. Kida (Prometheus Books, 2006) 286 pages.

You may also find the more scholarly book *At the Fringes of Science* by Michael W. Friedlander (Westview Press, Boulder, 1998) 216 pages to be helpful.

A list of useful related texts and references will also be provided as the course progresses.

Handouts

You are reading the first of several (helpful?) handouts that will be provided during the course.

Personal Assistance

This course is (or should be) a cooperative undertaking involving you, your fellow students, and the two of us. We are available for consultation outside the classroom when needed. The **Learning Center** on the main floor of the Frick Center is also available to work with you.

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Our office phones have 24-hour voice mail service. When leaving a voice mail message, it is best to make it more informative than a simple "call me." Normally, we read our email quite frequently, even when we're not on campus, but this is not always possible.

EVALUATION

Grades

Your grade in this course will be based on your achievements in 5 areas: (1) assigned course work (including common reading activities); (2) class participation; (3) comparison paper; (4) project and presentation; and (5) final paper. Work within each of the individual areas will be graded on a (somewhat arbitrary) point system. Designating the fraction of possible (assigned) points which you receive in area i by f_i , your final score in the course is given by the formula

$$S = 100 (0.30 f_1 + 0.15 f_2 + 0.20 f_3 + 0.20 f_4 + 0.15 f_5).$$

If you get a score of 65 or above, you are assured of at least a C in the course; 80 or above, a B; and 90 or above, an A (WOW!!). It is fairly easy to get a C with good steady effort, but you will need to really get your act together to earn an A or B. The following table summarizes the meaning of each letter grade in terms of level of academic achievement.

Letter Grade	Achievement Level	FYS-100.16 Score
A	Excellent (or Superior)	90% or above
B	Above Average	80% or above
C	Average	65% or above
D	Below Average (or Unsatisfactory But Passing)	below 65%
F	Failing	You don't want this.

The formula tells you the **minimum** grade you will receive in the course. Several conditions could cause you to receive a **higher** grade. In assigning grades, we may lower the "break points" for some or all of the letter grades if we consider that this will more accurately reflect the achievements of the class as a whole. We may also exercise the option of adjusting an individual grade upward in recognition of truly outstanding achievement in some particular area of work (e.g., an outstanding paper or exceptional interest, enthusiasm, or participation in class discussion, etc.) *You are responsible for keeping track of your scores in order to estimate how you are doing as the course progresses.*

Assignments

As we progress through the semester, you will receive occasional assignments either from the common elements or from material related to the topic of this section. You will usually have one week to complete them. Clarity of expression, correct use of terms and concepts, logical reasoning, and thoughtful analysis are essential to formulating "correct" responses. Of course, in many cases no single response is, in itself, "the" right answer. Except in cases of illness, etc., late assignments will not normally be accepted.

Assignments are to be turned in on 8-1/2" x 11" notebook paper or as email attachments. We will discuss this further in class. Any hand-written work should be on lined paper. Only one side is to be used. Odd sizes of paper or paper torn from spiral notebooks will not be accepted. Pages are to be numbered and clearly marked with the course number, your name, and the date. You should clearly show what question is being answered. Answers should be complete and self-contained. They must also be legible with proper grammar and syntax. In other words, you are expected to do a reasonably professional job of preparing your assignments.

Each of you is required to attend at least four campus intellectual or cultural events during the term. To receive credit for your attendance, you must turn in a brief (one to three paragraphs) reflection paper concerning the event.

Comparison Paper

Drawing on material from the Albert Einstein and Bill Gates videos that will be shown in class, you are to compare and contrast the background, characteristics, attitudes, etc. of these two men that led both of them to have extraordinary lives with outstanding achievements. You may also draw on other reliable reference sources if you wish. In any case, it is important to write in terms of specifics rather than vague generalities. More details will be provided when the videos are shown.

Project, Presentation, and Final Paper

You are to define, elaborate, execute, and present a group project in which you critically examine some example of pseudoscience or some significant science-based issue. The choice is up to you, but you will fare much better if your focus is fairly narrow and well-defined. We will, of course, be glad to help and will make suggestions as the term progresses. In your work you need to draw upon (and make reference to) various ways to distinguish real scientific knowledge from bogus knowledge claims (pseudoscience or "voodoo science").

As an initial concrete step, your group will need to prepare a **basic proposal** -- a few paragraphs explaining what you tentatively plan to do and how you plan to go about it. It should also include some specific references (5 or more) you plan to use. Of course, it would be best if you have already examined at least some of the references. It is very much to the point that you include and examine primary resources wherever possible.

Also note that I need to receive a **preliminary draft** (including reference citations, etc.) of your project paper early enough in the term that you have time to act on my suggestions after I read it and comment on it. How long should the paper be? That depends on many factors, but it seems hard to imagine that you could do justice to your group's efforts in less than 10 pages. Your group will also make an oral report presentation to the class.

An important starting point for developing the project, paper, and presentation is to clearly lay out the claims made by the proponents of your chosen area of (suspected) pseudoscience. On the other hand, while some historical background is helpful, protracted discussion of the history of the area usually doesn't contribute very much to the analysis – and it certainly is not, in itself, evidence for the validity of the claims. Similarly, long plausibility arguments don't substitute for systematic examination of the presence or absence of high-quality observational (or experimental) evidence.

You are to submit your proposal, draft, and final paper by email as a WordPerfect (.wpd) or Microsoft Word (.doc) email attachment.

ATTENDANCE

In accord with general College policy as stated in the Elmhurst College Bulletin (*a.k.a.* the College Catalog), regular class attendance is expected and is a requirement for receiving a satisfactory grade in this course. Class participation is an essential part of the course and contributes to your grade. If you must miss a course meeting, you must also take the responsibility for completing any assigned work for that day. Students who miss more than an occasional class invariably find it **very difficult** to earn a satisfactory grade.

WARNING

Academic Honesty is Essential! Academic honesty is a requirement for receiving a passing grade in this course. In your academic work, **do not** represent the work of someone else as your own. Any form of cheating is a serious offense, and the **normal penalty** is a **failing grade in the course for all involved**. This includes the student(s) who actually did the work! More severe action can and will be taken in extreme cases. In any case your reputation will be substantially damaged. We are obligated to report any instances of significant academic dishonesty to both the Vice President for Academic Affairs and the Dean of Student Affairs.

You are expected to become familiar with the general College policy on Academic Integrity as stated in the E-Book <http://media.elmhurst.edu/documents/EBook_2009_2010.pdf>. Printed copies may be obtained from the Office of the Dean of Student Affairs, Room 240 in the Frick Center. If you have questions about this matter, please discuss them with us.

ACCOMMODATIONS

The College will make reasonable accommodations for persons with documented disabilities. If you believe that you have a disability that may have some impact on your work in this course, please contact the *College Disability Services Provider* Ms. Maureen Connolly at (630)-617-3753.

COURSE EVALUATION

Near the end of the semester, you will be given the opportunity to provide a confidential evaluation of various aspects of this course, including our performance as instructors. If you have *suggestions for improvements*, they will be of even more use if they are made earlier than the formal evaluation. So please talk to one of us about them, send us an email note, or if you wish anonymity, slip a note under Earl's office door or put it in his campus mailbox (Campus Box #3). The course you save could be your own!

DISCLAIMER

The course syllabus and schedule are not a contract between the instructors and the students but rather a general guide to course expectations and procedures. While the provisions are as accurate and complete as possible, the instructors reserve the right to change any provision if appropriate. Students will be duly advised of such changes in class. It is the responsibility of each student to know what changes, if any, have been made and to successfully complete the requirements of the course.