# AC 2010-1737: USING THE COLLEGE SCIENCE FICTION CLASS TO TEACH TECHNOLOGY AND ETHICS: THEMES AND METHODS

**David Layton, DeVry University**

# Using the College Science Fiction Class to Teach Technology and Ethics: Themes and Methods

## Abstract

This paper proposes that one educational opportunity to enhance understanding of technology comes from the liberal arts. This opportunity is the teaching of ethics related to technology, science, and technological change, using science fiction for these themes. The course is proposed as part of a general education program in colleges and universities, given by Literature and Humanities departments. The paper proposes an alternative approach to teaching science fiction classes, one that treats the class as an *interdisciplinary* subject, not a primarily literary one. Such a course would focus on the scientific and technological themes of science fiction rather than on the literary technique. The paper includes some ideas for class themes, in-class assignments, essays, and team projects, all of which will have students use critical thinking methods for assessing how technology affects their lives.

## Introduction

That the human world has become more global and more technical has long been recognized. A persistent problem from this change has been how to harmonize personal lifestyles with technological change and the increasing global reach of technology. Human society may be rapidly becoming Marshall McLuhan's "global village" or the world may be getting "flat" as Thomas Friedman says, but the majority of people remain bewildered by these changes and how the changes affect lives. Generally speaking, people embrace popular devices well marketed with promises of "convenience," and then find themselves often frustrated and bewildered by how these devices unexpectedly change their lives. How can college liberal arts courses address these problems? What sorts of educational opportunities exist for enhancing general understanding of technology and its ethical uses?

One educational opportunity to enhance understanding of technology and related ethical concerns comes from the liberal arts. This opportunity is the teaching of science fiction. The class could be part of a general education program in colleges and universities given by Literature and Humanities departments. It also could be a class that Science and Engineering departments offer for general education credit.

## Teaching Science Fiction in the US

Many institutions of higher education offer classes in science fiction. Usually, the instructors for these classes are English and Literature professors, better versed in discussing plot structure, symbolism, characterization, and other primarily literary matters than they are in discussing science, technology, technological change, and social development. Because English and Literature professors perceive that the emphasis is on the "fiction" part of the name "science

fiction," they place the course content almost exclusively into a subcategory of Literature. James E. Gunn[1], science fiction writer and college professor at the English Department of the University of Kansas, identified three primary methods of teaching a science fiction class labeled as "science fiction," which are the "great books" method, the "social issues" method, and the "history of the genre" method. Most science fiction classes taught within English or Humanities departments in fact follow the great books model, which is to rely upon recognized classics of the genre, many with a decidedly "literary" style, and discuss in class "timeless themes" and narrative structures. Courses of this kind generally follow a read-lecture-discuss-write structure for students.

Gunn identifies in his own teaching one of the principal temptations of the science fiction class as a literature professor teaches it. He found that when he taught science fiction novels, the course subject matter became primarily "great books," in which "the class discussion of a novel had to deal largely with novelistic rather than science-fictional concerns." Through the remaining years of Gunn's instructorship, therefore, he focused more on the history of the genre, a matter coinciding with his multi-volume *Roads to Science Fiction* anthology. When I taught science fiction as a teaching assistant at <name of university> in the 1980s, it was a great books course in design, focusing principally on the literary qualities of the works in question and using recognized classics with a decidedly literary style or focus, such as H.G. Wells's "The Time Machine," Philip K. Dick's *The Man in the High Castle*, Joanna Russ's *The Female Man*, and Barry Malzberg's *Galaxies*. The science fiction class today at <name of university> is very little changed from what it was in the 1980s.

Teaching narrative structures, timeless themes, and other literary matters is not at all a bad thing to do; these matters belong to the core knowledge that every well-educated adult ought to have. However, does one need science fiction to teach these matters? Using science fiction to teach literary matters is redundant in English and Humanities departments that offer numerous courses specifically about these literary concerns. Perhaps for this reason, surprisingly few American universities and colleges actually offer a science fiction class as a regular item in their course schedules. To teach science fiction as a means of teaching Literature requires the instructor or department to justify the existence of the course. Since it is difficult to justify this existence in purely literary terms, many English and Humanities departments do not teach or irregularly teach the courses.

Because science fiction still seems odd to some academic imaginations, the science fiction class, when it is taught, gets thematized. Often, science fiction supplies a means to teach gender or racial issues. Hilary M. Lips[2] of Radford University in 1990, for instance, used science fiction to teach about such concepts as "the pervasiveness with which gender is used in our society to frame expectations about individuals and their behavior" (p. 197). Another class in 1994 used

science fiction to teach gay, lesbian, and bisexual issues[3]. This class, however, was a section in a required college composition course, and not a course specifically labeled "science fiction."

Additionally, because English and Humanities departments see science fiction as an interloper or outsider to the field of literature itself, they are not as territorial about it as they are about classic Literature. Thus, instructors from other departments will use science fiction or create science fiction courses as a means for non-literary lessons, such as science and engineering concepts. Typically, the classes that use science fiction to teach science concepts aim their lessons for high school classrooms, often as part of the science curriculum and not as part of the literature or humanities curriculum. A recent news report from Illinois in 2007, for example, features several high school and college science instructors, mostly in biology, using science fiction to teach about medical procedures, DNA, and genetics[4]. However, some college classes in science fundamentals have picked up the high school method of using science fiction to teach science.

Because of the high-school science orientation, lessons using science fiction often avoid matters of ethics. Gary Raham's[5] *Teaching Science Fact With Science Fiction* (2004) proposes using science fiction to "turn kids on" to science (p. 1). Raham seeks to use science fiction to "generate science-based epiphanies" (p. 5). Sample concepts from Raham's curricula include teaching the difference between instinct and learning (p. 3), using scientific errors in TV and film science fiction to teach correct science (p. 49), learning about insect metamorphic life cycles (p. 52), teaching Newton's theory of gravity (p. 57), and so on. Raham wants to avoid many of the ethical matters science fiction often raises. For example, he tries to allay readers' fears that using science fiction might alienate religious students (p. 6). He notes that *Star Trek* deals with "issues of ethics and human relationships that could have been explored in a contemporary setting" (p. 48), but steers the teacher who wants to use science fiction away from this course of inquiry and onto purely scientific matters. He does occasionally, and as a side matter, recommend some discussion of "the culture and political forces that influence the rate and nature of scientific advancement" (p. 51), but does not take this idea as a theme on which students would base their assignments.

Proposals for using science fiction in college classes to focus on science and technology are fewer than those for high school classes, yet these college-based proposals similarly focus on science fiction as a means for clarifying scientific concepts. Biology teacher Andrea Bixler[6] in 2007 proposed using science fiction to correct misconceptions about biology and to teach about molecular biology and evolution. Albert E. Segall[7] in 2002 proposed using science fiction to teach engineering concepts in college classes. Segall's idea is to break the popular misunderstanding that technology is a product of scientists and not of engineers. Segall helped design the class Engineering 280: Science Fiction and Engineering, taught at Clark College in Vancouver, Washington, and Washington State University, Vancouver. This course is now an

open "concepts" course, no longer strictly a science fiction course. Segall does argue for use of science fiction to teach some ethical issues related to engineering technology, especially those related to food, resources, and technological consequences. However, Segall's proposal discusses mostly the teaching of strictly engineering concepts. These included such areas as design requirements for the Starship *Enterprise*, the accuracy of engineering physics in science fiction stories, and computer communications systems. This course is also a fairly straightforward and traditional course, in which students watch a movie or video, or read a book or story, discuss the engineering concepts, and write essays.

There have been occasional forays into the kind of class that I am proposing. In the early 1990s, Gunn, in conjunction with Steve Goldman, taught a special science fiction course for the Kansas Committee for the Humanities program for secondary school teachers. Calling it "Prometheus Revisited: Human Values in a Technological World," and starting from C.P. Snow's *The Two Cultures*, the class dealt with the conflict between technology and the humanities primarily to provide a framework for aspiring high school teachers to learn to use science fiction in the classroom.

As science fiction classes zero in on specifically social and political issues, they begin to come closer to taking on the matters of technology and ethics. UC Berkeley in 2001 offered a one-time, two-unit, pass/no pass class called "Politics in Modern Science Fiction."[8] The instructor was a student in political science, and the class focused mostly, therefore, on strictly political matters. However, among essay topics for the course was one asking students to "1. Predict how advances in technology will change … human experience in the near future; 2. Predict, from that change, which groups will benefit and which groups will be hurt; 3. Explain what an individual (such as yourself) could do to modify, for the better, the nature of the change."[9]  In the early 1980s, at least one science fiction course focused on social response to technological change. In this course given at Trinity University in Texas and then at Bucknell University in Pennsylvania, Professor Spinks[10] focused on the "big picture" of technological society. The instructor paired fiction that had utopian or dystopian views of technology with readings from historians and cultural critics about the effects of technological change. More recently, Professor Courtney Brown teaches a science fiction and politics course in the Political Science department at Emory University similar in content and reading material to the classes at UC Berkeley and Bucknell University.

Science fiction classes of the past have sometimes taken an interdisciplinary approach. They have conjoined the study of literature with gender studies, political science, biology, physics, and even engineering. However, many of these courses have been special, one-time, or limited course offerings. Most were offered in departments other than Literature and Humanities, and only exceedingly rarely in Engineering departments, and have been given mainly as means to teach other curricula. In all these cases, the ethics of science and technology was taught as a secondary issue, subordinate to the main theme of the course.

## Developing the Ethics-Based Model

An alternative approach to teaching science fiction classes treats the class as an *interdisciplinary* subject, not a primarily literary one or primarily scientific one. The instructor would develop the course from realizing that most science fiction classes attract students of diverse academic majors. The science fiction course described below could be taught in English, Humanities, Sciences, and Engineering departments, available for general education credit. Such a course would focus on the scientific and technological themes of science fiction rather than on the literary technique and rather than on scientific theory. Some themes for consideration would include the scientific cosmic perspective, robotics and labor, bioethics, artificial intelligence, utopia and dystopia, and "mad" science. More specifically, since science fiction of the last two decades has focused quite closely on computer engineering, biological engineering, nanotechnology, and cybernetics, the course as described below could focus on these matters and how they affect society, personality, economics, and the definition of "human."

The University of Kansas offers such a class as an upper division English course primarily for English majors[11]. The course qualifies for either English or Humanities credit. One English professor and one Physics professor jointly teach the class. The class has discussions and lectures for class sessions based upon weekly themes, such as genetic engineering, nanotechnology, and future society. Students must write weekly summaries. Additionally, students write a research paper or major creative work based upon one of the class themes. Students must also give group presentations based upon class themes. If it can be done elsewhere, such a dual-focus design is very attractive, and delivers the interdisciplinary focus that many higher learning institutions favor today.

The class as I teach it mixes two of Gunn's general methods for teaching science fiction, the social issues method and the history of the genre method. Through the Winter 2010 session (<name of university> does not use traditional semesters or quarters), the undergraduate-level Science Fiction course had several learning objectives students were prepared to demonstrate after completing the course. Some were related to literary matters, but these objectives also included:

1. Given a science fiction novel, story, film, or television program representing technological innovation, evaluate the work's depiction of the social impact of technological change.

2. Analyze psychological, philosophical, ethical, and/or social problems in several science fiction print and non-print sources.

The class supported these two learning objectives with various stories including John Varley's "Lollipop and the Tar Baby," Isaac Asimov's "Robot Dreams," and Amitav Ghosh's novel *The Calcutta Chromosome*, among others. The reading list has changed in different incarnations of the class. These stories provoke students into thinking about the ethical issues related to technology and science. Varley's story is about a young woman who, with her partner, makes a living by capturing miniature black holes to harness for energy. A sapient black hole establishes connection with her and begins a discussion about the ethics of resource exploitation. In the process, the protagonist discovers that she herself is merely a clone of her partner, useful for business and sexual purposes, but easily gotten rid of. The story generates discussion of human technological need weighed against potential rights of living resources. Asimov's "Robot Dreams" tells about a scientist who designs a robot brain with the ability to dream. Through its dreams, the robot gains a sense of identity and that it and its kind are an exploited class on the verge of revolution. The story generates discussion about the ethics and responsibilities of scientists and engineers. Additionally, the story focuses attention on the goals of electronic and computer engineering. Students can question whether there ought to be restrictions on the directions of engineering developments, especially those pushing against normal definitions of "life" and "intelligence." Ghosh's novel *The Calcutta Chromosome* involves medical ethics, and whether biomedical developments, specifically the push toward human biological immortality, "belongs" only to those who develop the technology. The class also has one or two science fiction videos on similar themes.

Various other assignments support the themes in the readings and discussions. Students have a written paper assignment in which they must choose a film, television drama, or well-plotted role-playing game and discuss the ways that it explores the ethics of applied technology and/or the implications of scientific discoveries for humans and their societies. In-class exercises also support these themes. One of these is an Ethics Exercise, in which students in groups list all the ethical questions they can think of related to a specific reading. After open discussion of the questions and issues, students again get into their groups to devise multiple answers to the questions and issues raised. Again, students discuss their results. Finally, each group uses the previous work to devise a code of conduct. Another activity has students list various future technologies that they have heard about, and then come up with a list of future jobs based upon those technologies. These and other activities have the goal of getting students to think like science fiction writers, and so to think about the implications of rapid technological change for humans and society. These goals support Humanities curricula in the areas of philosophy, political science, and history. The goals also support Engineering curricula in the areas of applied science, professional ethics, and history of technology.

The centerpiece of the class is a session-long, multipart Team Project, in which students working in teams create, develop, and present their own science-fiction world. Students work from the following scenario: "You are a team of official investigators, sent by Earth authorities to research the possibility of establishing diplomatic relations with a newly discovered world. Your job is to

investigate the planet and produce a report summarizing your findings and suggesting means for establishing relations." By the end of the course, each team must deliver a 1700 word or longer formal report and a twenty-minute oral presentation about its world. The report needs to include an analysis of the physical details of the world, with an emphasis on scientific plausibility. Thus, students must research planetary physics, ecology, meteorology, and so on. In the process, students learn about how physical conditions affect modes of living. Important in this stage of the project is that students must identify at least one special resource unique to this world, which supplies the motivation not only for diplomatic relations, but also for trade and/or exploitation. Through this, students learn to see how need drives technology, how technology drives need, and how both these causes in turn drive politics. In Part II of the project, each team develops its concept of an alien or human colonial civilization on this planet. Again, scientific plausibility is enforced. Through this exercise, students will begin to see the connections between material conditions, technological development, and social development.

One theory driving this course design is that student-generated questions and brain storming builds critical thinking skills. Critical thinking is vital for making proper ethical technological and scientific decisions both in everyday life and in the fields of engineering and science. A well-recognized problem in higher education today is the large number of students intellectually unprepared for college-level work, with the result that too many students only vaguely comprehend essential concepts and core intellectual skills. A class such as the ethics-based science fiction class stimulates critical thinking about technological and scientific matters by focusing on a key area of critical thinking – ethical thinking.

The class also builds key critical thinking skills for students by having students generate their own questions and seek answers to the questions they generate. Getting students to ask good questions engages their minds more fully and helps students take charge of their own educations. The right kinds of questions are vital to obtaining these goals. These questions would involve higher-order learning instead of simple matters of fact or procedure. Getting students to ask questions related to the ethics of technology and science engages higher-order learning processes. In answering higher-order questions related to ethics that they themselves generate, students engage other areas of critical thinking, including analysis, evaluation, and creativity.

## Problems in Creating and Implementing the Proposed Course

There are a few problems holding back implementation of the ethics-based science fiction class more widely in US institutions of higher learning. These problems derive from two areas: university and departmental attitudes about science fiction, and the comfort and knowledge of the instructors.

Typically, colleges and universities view science fiction courses as "extra." Many colleges and universities offer no science fiction courses at all. Many others offer them infrequently. English and Humanities departments often offer science fiction courses under a general "themes" or

"genres" course, which changes types of literature based upon professor interest. When science fiction does not belong to the core of a department, it gets easily shifted away from Literature-oriented departments. Thus, science fiction is the only form of Literature offered as the main focus of some engineering and science classes. To compare, one can imagine an Engineering class in which the main reading was nineteenth-century industrial novels and immediately sense how unlikely such a course would be. Engineering and Science departments offer these courses more infrequently than do Literature departments, and usually as way to popularize engineering and science or to correct mistaken ideas about engineering and science. Because science fiction is still widely held to be "popular" and "light," it simply does not hold the attention of many department heads and administrators and so becomes "fair game" for what would otherwise be seen as "poachers" in the literary fields.

Placing an emphasis on ethics of technology and science can give the science fiction course the appearance of greater depth more in keeping with accepted academic standards than is its reputation. The last two decades has seen increased emphasis in colleges and universities upon ethics education, so this class fits their current understanding of their educational missions. The course also ties in with another curricular focus of the last two decades – interdisciplinary education. This course is truly interdisciplinary, easily co-taught by instructors from different fields, and thus helps break student misconceptions that every course is a unique event unrelated to other courses.

Another cause for concern in implementing the ethics-based science fiction course more widely comes from the instructors. Instructors from Literature departments may be uncomfortable with the science and technology aspects of the course, feeling themselves out of their depth. One reason that Literature professors emphasize the "fiction" in science fiction is their own comfort and expertise. Likewise, instructors from Science and Engineering fields may feel uncomfortable with literary or philosophical matters related to teaching science fiction, and thus prefer to focus on "correct" science.

However, since matters of science, technology, and their effects are essential to science fiction, professors from Literature departments who would teach science fiction classes really ought to be more knowledgeable in these areas. If a science fiction class were to be a pure Literature course, then there is no reason to use science fiction. Having a science fiction class means focusing on aspects unique to science fiction. This means placing at least as much emphasis on the "science" as on the "fiction." The kind of course proposed in this paper requires that the instructor stay attuned to developments in technology and science. The instructor in a Literature department need not be an expert in these fields, but does need to have knowledge of relevant science and engineering fundamentals. Instructors from Science and Engineering departments in turn should have a working knowledge of literary and philosophical fundamentals. In either case, the instructor ought to know where to find relevant background and theoretical material. The instructor can supply material to the students as supplemental reading, or as preliminary reading required before discussion, or required as part of a project or essay assignment.

## Conclusion

The proposal in this paper is that a science fiction course taught in a college-level English or Humanities department is better suited to teaching themes distinct to science fiction, namely the effects of technological change upon people and societies, than is a standard Literature-oriented science fiction course. Likewise, Engineering and Science departments can expand their reach and popularity through offering an interdisciplinary science-fiction course. The proposal is that the themes of technology, science, and their effects be the central focus of the class, and not incidental or episodic. Past science fiction courses have had this kind of focus, but these have been few. Many English and Humanities departments should rethink the design and focus of their science fiction courses. Many Engineering and Science departments should think of offering interdisciplinary science fiction courses, perhaps jointly with Literature or Humanities departments. Many colleges and universities not currently offering science fiction courses should perhaps begin to offer them along the model laid out in this paper. A science fiction literature class is a superb opportunity for building student and instructor critical thinking skills, increasing technological literacy, and meeting key academic goals for colleges and universities nationwide.

**Bibliography**

1. Gunn, J. E. Teaching science fiction. *Science-Fiction Studies* 23, no. 3 (November 1996): 377-384.

2. Lips, H. M. Using science fiction to teach the psychology of sex and gender. *Teaching of Psychology* 17, no. 3 (1990): 197-8.

3. Marchesani, J. J. Constellation prizes: Using science fiction for lesbian, gay, and bisexual issues in college classes. Paper presented at 45th annual Conference on College Composition and Communication, Nashville, March, 1994. ERIC Database. http://www.eric.ed.gov///sql/_storage_01/b////e.pdf (accessed December 28, 2009).

4. Litas, L. A. Teens now able to take advanced science classes in high school. *Daily Herald* (Arlington Heights, IL), August 7, 2007.

5. Raham, G. *Teaching Science Fact with Science Fiction*. Portsmouth, New Hampshire: Teacher Ideas Press, 2004.

6. Bixler, A. Teaching evolution with the aid of science fiction. *The American Biology Teacher* 69, no. 3 (2007): 337-8.

7. Segall, A. E. Science fiction in the engineering classroom to help teach basic concepts and promote the profession. *Journal of Engineering Education* 91, no. 4 (2002): 419-20.

8.  Harihareswara, S. Politics in modern science fiction [Course Syllabus]. Harihareswara.net. http://harihareswara.net/.html (accessed December 28, 2009).

9.  Harihareswara, S. Politics in modern science fiction [Course Content]. Harihareswara.net. http://harihareswara.net/.html (accessed December 28, 2009).

10. Spinks, C. W. Prophecy, pulp, or punt: Science fiction, scenarios, and values. Paper presented at 5th Annual Conference of the World Future Education Society, Dallas, February, 1983. ERIC Database. http://www.eric.ed.gov///sql/_storage_01/b////.pdf (accessed December 28, 2009).

11. Baringer, P., and McKitterick, C. Science, technology, and society [Course syllabus]. The J. Wayne and Elsie M. Gunn Center for the Study of Science Fiction, University of Kansas. http://www2.ku.edu/ ~sfcenter/Tech-Society/Tech-Society-syllabus.htm#optionb (accessed December 26, 2009).