Course Title: "Hard" Science Fiction
ENGLISH 121D
Location: Lathrop 292
Tues Thurs, 4:30-5:50

Instructor:
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Course Description:

What makes hard science fiction "hard"? What's the science? What's the fiction? And why do we care about the difference?

In this course, we will investigate different traditions of hard science fiction, trace the interactions between "real" science and science fiction, and consider the scientific education and outreach potential of hard science fiction. We will read, watch, and play hard science fiction that draws on a number of disciplines: physics, data science, linguistics, biology, politics, and others. Course texts will include works by Ted Chiang & Carl Sagan, episodes of *Star Trek*, and fan reviews & commentary. We will conclude the course by thinking about the relationship between science fiction, academia, and literary prestige–asking questions about why, how, and to whom this genre matters.

Essential Questions:
What is the relationship between science fiction and science?
What could it be? What should it be?
What does the genre distinction of "hard" science fiction do for us?

Course Outcomes and Objectives:
By the end of this course, students should be able to:
- Articulate and defend a definition of hard science fiction that takes into account the various reasons for genre definition, the power and prestige associated with such a definition, and the types of texts this definition will include and exclude.
- Make claims about what hard science fiction has done for us, what it can do for us (its affordances), and what it should do for us.
- Articulate what they enjoy and do not enjoy, as readers, watchers, and players of hard science fiction.
- Analyze and respond to the claims of others about "scientific rigor" and "real science" within science fiction.
- Make a case for or against hard science fiction's pedagogical and outreach potential.

Curriculum:

Week 1: Getting started, Genre Definitions		
Tuesday	Due by 8 pm: Intake survey	Read: Syllabus
Thursday	Due: Highlight Hartwell for genre definitions, distinguishing between: a) ones you like/find useful b) ones you don't like/don't find useful	Read: Clarke, "Hammer of God" (Canvas) Godwin, "The Cold Equations" (http://www.lightspeedmagazine.com/fiction/the-cold-equations/) **Spoiler Alert: Contains Spoilers for "The Cold Equations":** Hartwell, sections I and III from "Hard Science Fiction" (Canvas) Skim: Anders, "20 Great Infodumps from Science Fiction Novels" (https://io9.gizmodo.com/20-great-infodumps-from-science-fiction-novels-5481558)
Week 2: Domain Knowledge and Scientific Literacy		
Tuesday	Due: *Jurassic Park* pre-assessment	Read: Crichton, *Jurassic Park*
Thursday	Due: *Jurassic Park* post-assessment	Read: Crichton, *Jurassic Park* "Jurassic Park" (*https://rationalwiki.org/wiki/Jurassic_Park*)
Week 3: Doing Science--The Scientific Method, Falsification, and Engineering		
Tuesday	Due: Take the 2 linked quizzes in the NPR article and jot down your notes on what you think they were testing/ how they made you feel/ what they made you think / if you were tempted to "cheat." Bring to class.	Watch: *Star Trek, The Next Generation*: "The Quality of Life" (S06: E09) Read: "Scientific Method" sections 1, 2, 3.1-3.3, 6, 7 (https://plato.stanford.edu/entries/scientific-method/) Suvin, selections from *Metamorphoses of Science Fiction* (Canvas) "Scientific Literacy" (https://www.npr.org/sections/13.7/2015/09/14/440213603/scientific-literacy-it-s-not-just-about-the-facts)
Thursday		Read: Asimov, selections from *I, Robot.* Drexler, *Engines of Creation 2.0* pg 125-141 (Canvas) Op-Ed: "Isaac Asimov's Laws of Robotics are Wrong" (https://www.brookings.edu/opinions/isaac-asimovs-laws-of-robotics-are-wrong/)

Week 4: Doing Science--Exploration/Discovery and Exact Science		
Tuesday	Due: *Contact* Pre- and Post-Assessments	Watch: "Contact" Read: Selections from Sagan's *Contact* (Canvas)
Thursday	Due: Annotations in hypothes.is on *Foundation*	Read: *From* Asimov, *Foundation* (Selections on Canvas)
Week 5: History/Analogue		
Tuesday		Read: Gould, "Evolution and the Triumph of Homology; or, Why History Matters" (Canvas) Wells, "The Time Machine" (Canvas) Foucault, selection from *The Order of Things* (Canvas) Handout, "Definitions of the Experimental Novel" (Canvas)
Thursday	Due: Midterm	Read: Le Guin, "Schrödinger's Cat" (Canvas) Bear, "Schrödinger's Plague" (Canvas) Selections from Bailer-Jones, *Scientific Models in Philosophy of Science* (Canvas), with special attention to sections 1.1, 3.0, 3.1, 3.2
Week 6: Futurity and Simulations		
Tuesday		McAuley, "Gene Wars" (Canvas) Doctorow, "The Brave Little Toaster" (Canvas) Drexler, "Letter from the author," from *Engines of Creation 2.0* (Canvas) Minsky, "Foreword," from *Engines of Creation 2.0* (Canvas) Cass, "Introduction," from *2011TRSF* (Canvas) Clarke, "Preface" to *2001: A Space Odyssey* (Canvas) Franzen, "What if We Stopped Pretending?" (https://www.newyorker.com/culture/cultural-comment/what-if-we-stopped-pretending) (Feel free to explore some of the backlash to Franzen's piece, on twitter or elsewhere. I'll be bringing in a curated collection of tweets and responses to class)
Thursday		Read: "Half-Life 2" (Canvas) Watch: "Half-Life 2 beta: demo_physics" (https://www.youtube.com/watch?v=O7ZdRFiymnE) "The SCIENCE! Behind Half-Life's Gravity Gun" (read some of the comments and pick the one you find most interesting for discussion)

		(https://www.youtube.com/watch?v=aFI74IqDYsU) Play: Watch a playthrough of or Play "Point Insertion" (Half-Life 2) (If you get really motion-sick, like I do, with first-person simulations, come talk to me and we can develop an alternate assignment)
Week 7: Models, Simulations, and Systems		
Tuesday	Due: Simulators and Systems worksheet for one of the three games	Play: *Plague, Inc* or *Pandemic* ***AND (this is a change)*** *Niche*
Thursday	Due: What's the world-generator's model for "world"? In no more than three sentences (like an extended thesis). Bullet-point your evidence below.	Play: World-generator (Pretend you're a science fiction writer, google "world-generator," and click around until you find one you think would help you write an epic 6-part series. Play it. Take some notes. What's its model for "world?") Read: https://io9.gizmodo.com/could-science-fiction-books-help-rescue-nasa-5833734 (and the comments) https://www.indiegamewebsite.com/2019/06/11/spaceengine-early-access-review/ http://forum.spaceengine.org/viewtopic.php?f=6&t=72 (Focus on the initial post, but if you're interested, the responses to the post say a lot about how people play this game)
Week 8: World-building		
Tuesday		Miéville, "Afterword--Cognition as Ideology: A Dialectic of SF Theory" (Canvas) Selections from *Putting the Science in Fiction: Expert Advice for Writing* (Canvas)
Thursday		Peterson, "Introduction" from *The Art of Language Invention* (Canvas) Delany, *Babel-17*
Week 9: Epistemic challenges to the hegemony		
Tuesday		Delany, *Babel-17*
Thursday		Okorafor, *Binti* Dillon, "Introduction" (Canvas)
Week 10: Limit Cases and Education/Outreach		
Tuesday		Park, "Readymade Bodhisattva" (Canvas) Le Guin, "The Ones Who Walk Away from Omelas" (Canvas)

Thursday		Watch: The Magic School Bus "Inside Ralphie" Selections from Nova, "The Elegant Universe" "Sub-Zero's Head Shatter | The Science of Mortal Kombat" (https://youtu.be/9jSDuCoMFiA)
Finals Week		
	Due: Final Essay and course evaluations	

Assignments:

Daily writing:

This is an exploratory class, with the quarter structured around our three essential questions. To that end, each class is structured around a question--perhaps one of our essential questions, or a smaller question that will help us think about our essential questions. If you have difficulties participating verbally in class, this is your time to shine! For those of us who have no problem talking (perhaps too little difficulty talking), this is an opportunity to slow down a bit and reflect on what we've said.

The last 5-10 minutes of each class are reserved writing and thinking time (for me too)-- you don't have to commit to this answer for the whole quarter (we'll revisit some questions as we get more data) but it should reflect where you stand right then, at the end of class. Please bring your laptops or another device you can write quickly and comfortably on. Prompts will be provided with a google form link at the end of each class. In the case of a technology-related emergency, we may end up hand-writing (I'll always have paper for us).

You should reference our class discussions (informal citations such as "As we discussed in class today" will be fine, and if you can remember who specifically raised the point, even better!), course material, outside materials, your own expertise, and your own research for the midterm/final, but try not to lean exclusively on any one source. This is an exercise in synthesizing our thinking.

As far as spelling/grammar/structure are concerned; I want you thinking about the question, not about how your writing looks. Provided I can make sense of it, I'm happy to receive it. If I'm having difficulty interpreting your thoughts because of your writing, I'll let you know, and you can adjust.

Pre- and Post- Assessments

For some of our texts, you'll complete pre- and post- reading assessments that check your understanding of, or at least familiarity with, some scientific concepts (The distinction between understanding and familiarity--and whether these reflect "learning"--is going to be an important one for this class). These will be graded for completion. What matters is your attention to the process of "learning" that happens during reading. These assessments are designed to call your attention to the way these texts teach you (or don't!) the "hard" science they are based on. These assessments will be google forms, linked on Canvas, and due at the start of class.

Annotation/Markup:

You will annotate selections from *Foundation*, highlighting passages you identify as "science," whatever that means to you at the time you read the selection. I will extract those highlighted passages, anonymize your identities, and compare, computationally, the passages we've selected as a class. Those results will serve as the basis for further discussion and analysis. Details in the Canvas module.

Midterm:

Find some "this isn't hard enough" criticism, and analyze its warrants, sources, and definition of hard science fiction. This could be based on:

a) one new text and one in-depth review (e.g. a podcast, a full article)

b) a text already on the syllabus, but comparing multiple reviews (e.g. goodreads, amazon, twitter, blogposts etc)

c) an alternative you propose and have approved at least 10 days before the assignment is due with the instructor

Be prepared to casually present your findings to the class. Everyone will produce a 1-page "highlights" document (template and example will be distributed in class) to share with others. Students taking the course for 3 units will produce a 2-page warrant analysis; students taking the course for 4 units will produce a 3-page warrant analysis; students taking the course for 5 units will produce a 5-page warrant analysis. See Midterm assignment rubric and guidelines on Canvas for more details.

Final:
Write a counter-argument-led paper for the inclusion of a text in the category of "hard" science fiction. This may include fantasy novels, realism, historical fiction, or other "soft" science fiction. The paper should begin with the reasons the work is typically excluded or does not seem a likely candidate, then define hard sf, and then make the case for inclusion given that definition.

The conclusion of the paper should meditate on why genre inclusion matters. What do we see anew with this distinction? What does it change?

3 units: 4-6 pages
4 units: 8-10 pages
5 units: 12-15 pages

Grading Policies
Participation, including attendance and daily writing: 25%
Completion of Pre/Post Assessments and Annotation: 15%
Midterm: 25%
Final: 35%

Extra credit opportunities:
There will be extra credit opportunities offered to all students throughout the quarter.

Extensions:
Life happens, and, unlike jury duty, it rarely can be forced to happen on the academic timeline. If you need an extension, or suspect you may need an extension, let me know as soon as possible.

Late work:
Late work is accepted until 24 hours before grades are due to the Registrar, and will be penalized at ⅓ a letter grade per day late.

Course Policies
Absences
This is a discussion-based class, and participation is an essential part of the course design. If you must miss class for health or academic reasons, please let me know as soon as possible. You will be required to complete the end-of-class writing assignment virtually. You may miss one class, provided you notify me ahead of time, without any penalty to your participation grade. If you need to miss more than one class, we will discuss make-up work and deadlines depending on your situation. If you are ill and suspect it may

be contagious, please do not come to class--there are ways to attend class virtually that do not expose the rest of us to your germs, such as Zoom.

Our community
Science fiction is for everyone. Gatekeeping, harassment, or any behavior that makes our classroom space non-welcoming will not be tolerated. I expect students and myself to strive towards the creation of an inclusive community; to that end, we will set classroom norms for our discussions and revise them as necessary. If you bring up a concept, theory, author, text, meme, character, internet space--anything--not on the syllabus--you have to introduce it, briefly, generously, and in a way that demonstrates its use to discussion. This is a habit that takes practice, and to help us in developing this habit, asking clarifying questions about newly-introduced information is encouraged.

Students with Documented Disabilities
Students who may need an academic accommodation based on the impact of a disability must initiate the request with the Office of Accessible Education (OAE). Professional staff will evaluate the request, review appropriate medical documentation, recommend reasonable accommodations, and prepare an Accommodation Letter for faculty dated in the current quarter in which the request is being made. The letter will indicate how long it is to be in effect. Students should contact the OAE as soon as possible since timely notice is needed to coordinate accommodations. The OAE is located at 563 Salvatierra Walk (phone: 723-1066, URL: http://oae.stanford.edu).