# Science in Literature v1.0

a pilot inter-domain gen ed course



from Hickman and Pitarra. The Manhattan Projects

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# Overview

- 1. Introductions
- 2. Background
- 3. Course structure
- 4. Learning Objectives for the course
- 5. Examples of assignments and student responses
- 6. Discussion strategies
- 7. Making adjustments
- 8. Assessing the course: student feedback

# Background

Our crazy dream and how, in actual fact, we got to do it!

The original idea: a chronological creative/cultural analysis of "the scientist."

# Course structure: our process

- 1. Selecting texts
- 2. Selecting science topics
- 3. Spinning a thread
- 4. Accommodating team teaching
- 5. Setting high expectations for student participation
- 6. Aligning assignments with pedagogical priorities

(We wrote the learning objectives last, after content and structure were final.)

At the meeting on		we will have a discussion about	after we have prepared by reading
1	Tue 10 Jan	Introduction	
2	Thu 12 Jan	"The response was cold: it was also negative."	The Two Cultures
3	Tue 17 Jan	Basic physics, chemistry, and biology	(material provided on Canvas)
4	Thu 19 Jan	"Busy, busy, busy."	Cat's Cradle
5	Tue 24 Jan	The atom	(material provided on Canvas)
6	Thu 26 Jan	"Is he MAN or MONSTER or is he BOTH?"	The Incredible Hulk and the texts provided
7	Tue 31 Jan	The atom and mutation	(material provided on Canvas)
8	Thu 02 Feb	"Science. Bad."	Manhattan Projects
9	Tue 07 Feb	DNA, genes, and genomes	(material provided on Canvas)
10	Thu 09 Feb	"They didn't stop to think if they should."	Jurassic Park
11	Tue 14 Feb	Deep time	(material provided on Canvas)
12	Thu 16 Feb	"Doubt of the real facts is inevitable."	At The Mountains of Madness
13	Tue 21 Feb	Evolution	(material provided on Canvas)
14	Thu 23 Feb	"Now, indeed, I seemed in a worse case than before."	The Time Machine, On The Origin of Species (selections)
15	Tue 28 Feb	DNA manipulation and biotechnology (part I)	(material provided on Canvas)
16	Thu 02 Mar	"Let us get rid of the chaos."	Oryx and Crake
	Tue 07 Mai	SPRING BREAK: NO CLASS	
	Thu 09 Mai	SPRING BREAK, NO CEASS	
17	Tue 14 Mar	DNA manipulation and biotechnology (part II)	(material provided on Canvas)
18	Thu 16 Mar	"The pigoons of his childhood hadn't lacked heads."	Oryx and Crake
19	Tue 21 Mai	Pathogens and infectious disease	(material provided on Canvas)
20	Thu 23 Mar	"It was the blood. There was something in the blood."	28 Days Later
21	Tue 28 Mai	Neuropharmacology	(material provided on Canvas)
22	Thu 30 Mar	"Ah, how mistaken I was about this world!"	The Futurological Congress
23	Tue 04 Apr	Climate change	(material provided on Canvas)
24	Thu 06 Apr	"The worst thing is that we saw it coming decades ago."	Not Dark Yet
25	Tue 11 Apr	A step back for some analysis	(material provided on Canvas)
26	Thu 13 Apr	"Seriously unthinkable: not available to think with."	Selections from Staying with the Trouble
27	Tue 18 Apr	Student presentations	Selections as provided by the groups
28	Thu 20 Apr	Student presentations	Selections as provided by the groups
29	Tue 25 Apr	Student presentations	Selections as provided by the groups
	Thu 27 Apr	Course wrap-up	

# Course structure: Selecting texts Selecting science topics Spinning a thread

We started with texts, and fit the science topics to the literary themes.

But which science topics?

And how to make it all hold together?

Examples: connecting H.G. Wells and Charles Darwin

discussing Vonnegut and Ice-Nine first

# Course structure: Accommodating team teaching

How do we **divide the labor** in a interdomain, interdisciplinary course?

### Our solution was:

One text assigned per week . . .

- . . . framed with science on Tuesday
- . . . discussed as a literary text on Thursday

(sometimes followed by a written "Short Response" due Friday)

# Course structure: Setting high expectations

... for student participation

# Course structure: Aligning assignments and priorities

	TOTAL	1000
Group presentation	A fifteen-minute analysis of a text you choose as teams of three.  (Your group assignments will be announced after the add/drop period ends.)	
Term paper	A longer reflective analysis of one topic of your choice.  1,500 words, due in class Thursday March 7 CORRECTION: March 2	200
Short responses	Short reflective analyses written outside of class. 250–300 words (4 × 50 points)	200
Incidental writing	Very brief written responses to prompts during class meetings. 100–150 words (10 × 20 points)	200
Class participation	Your contributions to the discussions during class meetings.	200

# Learning objectives

Taken directly from the new gen ed guidelines\*

<sup>\*</sup> https://gened.psu.edu/updated-learning-objectives-and-foundation-and-domain-criteria

(each course will have 2-4 per senate implementation report March 15, 2016)

- 1. EFFECTIVE COMMUNICATION the ability to exchange information and ideas in oral, written, and visual form in ways that allow for informed and persuasive discourse that builds trust and respect among those engaged in that exchange, and helps create environments where creative ideas and problem-solving flourish.
- KEY LITERACIES the ability to identify, interpret, create, communicate and compute using materials in a variety of
  media and contexts. Literacy acquired in multiple areas, such as textual, quantitative, information/technology, health,
  intercultural, historical, aesthetic, linguistic (world languages), and scientific, enables individuals to achieve their
  goals, to develop their knowledge and potential, to lead healthy and productive lives, and to participate fully in their
  community and wider society.
- 3. CRITICAL AND ANALYTICAL THINKING the habit of mind characterized by comprehensive exploration of issues, ideas, artifacts, and events before accepting or formulating a conclusion. It is the intellectually disciplined process of conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action.
- 4. INTEGRATIVE THINKING the ability to synthesize knowledge across multiple domains, modes of inquiry, historical periods, and perspectives, as well as the ability to identify linkages between existing knowledge and new information. Individuals who engage in integrative thinking are able to transfer knowledge within and beyond their current contexts.
- CREATIVE THINKING the capacity to synthesize existing ideas, images, or expertise in original ways and the experience of performing, making, thinking, or acting in an imaginative way that may be characterized by innovation, divergent thinking, and intellectual risk taking.
- 6. GLOBAL LEARNING the intellectually disciplined abilities to analyze similarities and differences among cultures; evaluate natural, physical, social, cultural, historical, and economic legacies and hierarchies; and engage as community members and leaders who will continue to deal with the intricacies of an ever-changing world. Individuals should acquire the ability to analyze power; identify and critique interdependent global, regional, and local cultures and systems; and evaluate the implications for people's lives.
- 7. SOCIAL RESPONSIBILITY AND ETHICAL REASONING the ability to assess one's own values within the social context of problems, recognize ethical issues in a variety of settings, describe how different perspectives might be applied to ethical dilemmas, and consider the ramifications of alternative actions. Individuals should acquire the self-– knowledge and leadership skills needed to play a role in creating and maintaining healthy, civil, safe, and thriving communities.

# Our selected learning objectives

Effective communication. We will conduct integrated discussion of scientific ideas and their cultural and social reflection in literature. You will write short responses at the end of these discussions from time to time, and you will explore these ideas in more detail in writing and in a group presentation.

**Key literacies.** Our texts range over novels, short stories and novellas, graphic novels, films, poetry, memoir, scientific journalism, and science textbooks. You will thus develop textual, visual, health, scientific, aesthetic, and historical literacies in this course.

**Critical and analytical thinking.** By evaluating competing scientific, ethical, and literary/cultural viewpoints over a range of topics, you will develop critical and analytical thinking.

Integrative thinking. You will synthesize knowledge encompassing scientific and cultural ideas, across multiple historical periods, and grapple with extrapolating these analyses to the near and far future.

Social responsibility and ethical reasoning. You will articulate and critique your own values with respect to the ethical issues raised by our discussion topics as illuminated by our literary texts.

# Examples of student responses to assignments

"incidental writings" during class meetings

"short responses" outside class meetings

Not shown: term papers

group presentations

class participation

Incidental writing re: Vonnegut and the Second Law

What is **plausible** about Ice Nine? (What is implausible?)

What is **possible** about Ice Nine? (What is impossible?)

# Student response (a humanities major)

What is plausible about Ice Nine? (What is implausible?)

It is certainly plausible to develop the structures of Ice Wine under different conditions, such as temperature and pressure.

What is implausible 13the scale at which the Scene portrays and depicts. The energy released out yes. from the proof change would create an exponential amount of heat, and therefore melt the Ice. 9.

What is possible about Ice Nine? (What is impossible?)

It's possible to create similar structures of Ice-Nine under specific conditions, where you con Control temperature and pressure.

whats impossible is the energy released or heat released would melt the solid Ice-wine and the Oceans that frozenover in cots cradle.

# Student response (a science major)

What is playsifie about Ice Nine? (What is implausible?)

It is thinking plausible for Ice a to form the crystals, but account of the energy released from forming the crystals in the form of heat) are crystals would mit.

What is passible about Ice Nine? (What is impossible?)

It is possible for Ice 9 to cause a phase change that mount effectively freeze the water at a certain temperature and pressure, but not under the conditions on earth like stated in the text.

BOOM

Incidental writing re: diffusion demonstration

Consider the diffusion of food coloring in hot and cold water. What observations do you make? What molecular explanation can you give for these observations?

# Student response (a humanities major)

Consider the diffusion of food coloring in hot and cold water. What observations do you make? What molecular explanation can you give for these observations?

Each drop within the individual glasses of water have different expanding properties. The glass on the left appears to be distributing the food covering amongst the molecules in the water. Whereas entire the glass on the right appears to be containing or keeping the water food coloring close together.



# Student response (an arts major)

Consider the diffusion of food coloring in hot and cold water. What observations do you make? What molecular explanation can you give for these observations?

On a molecular level, it would appear that the Jye on the left is while to move More freely through the Mikeup of the whier. The converse can be said for the Jye on the left has spread hhrough the whole cup while the Jye on the light never removed the full area of the glass. I believe that, in both glasses, the Water molecules are bigger than the molecules of the Jye. This crowtes a tension of movement in the space provided.

WMM... Not really...

Out good thinking at

# Student response (a science major)

Consider the diffusion of food coloring in hot and cold water. What observations do you make? What molecular explanation can you give for these observations?

Hot water - the food coloring speeds quickly

Cold water - food coloring appeads storry

Melecular are moving more quickly in hot water,

facilitating the spread

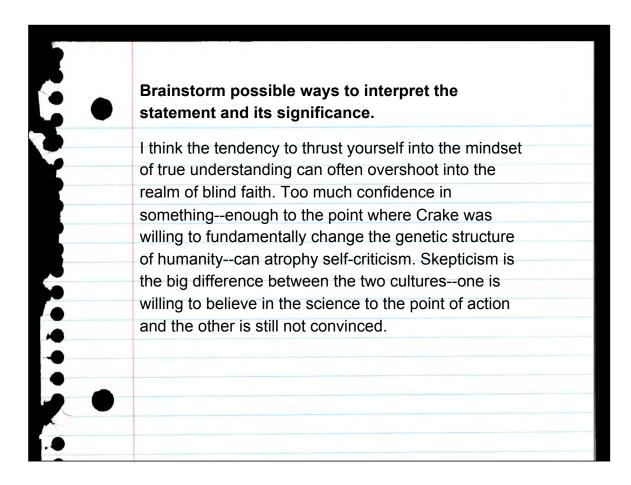
(increased Brownian motion)

# Incidental writing for Atwood, Oryx and Crake

When Jimmy first visits Crake's office at RejoovenEsense he notices that "Crake still had a collection of fridge magnets, but they were different ones. No more science quips" (300). Among the new slogans is "We understand more than we know." Later, when Jimmy confronts Crake at the airlock, that same slogan flashes through his mind: "All the hairs on his arms were standing up. We understand more than we know" (328). Clearly, Atwood wants the reader to think about this particular statement, to unpack its potential meanings.

In the space below,

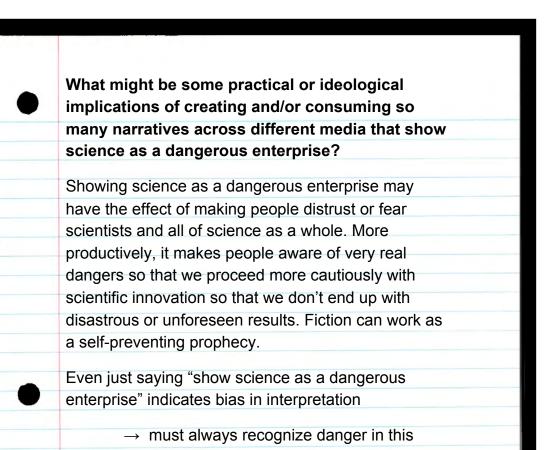
- 1. brainstorm possible ways to interpret the statement and its significance;
- 2. consider the statement in the context of C. P. Snow's idea of the two cultures.

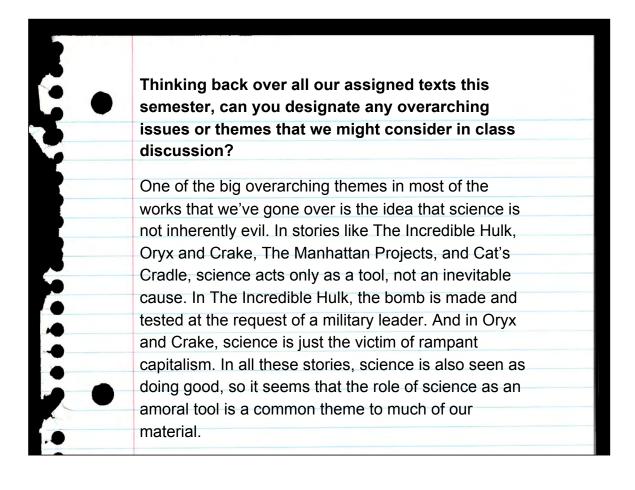


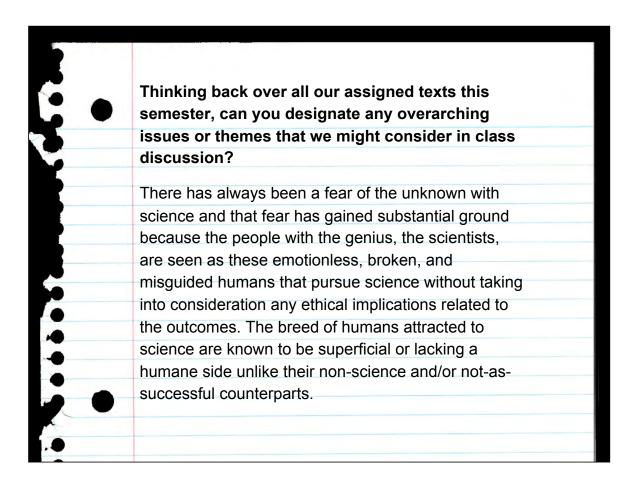
	ntext of C. P.
to both this novel and Snow's lecture, "words people") have general understanding of certain subjects or concepts more than we have specific and "specialized" knowledge of certain subjects or concepts. This specialization is something Snow remarks on numerous times in his lecture and he sees it as an issue in our education. In Atwood's novel, Snowman/Jimmy alludes to the separation of "words people" and "numbers people."	re, "words people") ain subjects or ic and subjects or nething Snow ecture and he . In Atwood's he separation of

# Incidental writing: making final connections

- 1. What might be some practical or ideological implications of creating and/or consuming so many narratives across different media that show science as a dangerous enterprise?
- 2. Thinking back over all our assigned texts this semester, can you designate any overarching issues or themes that we might consider in class discussion?





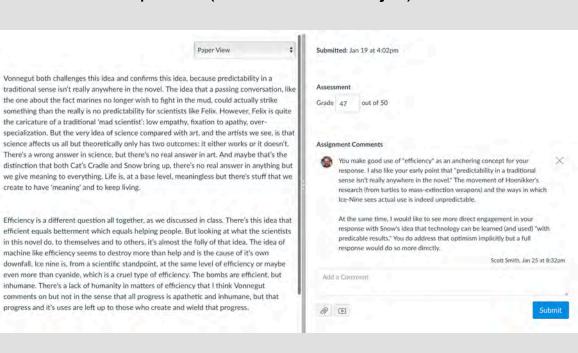


# Short responses: one of Smith's

In "The Two Cultures" C.P. Snow writes that "technology is the branch of human experience that people can learn with predictable results" (p. 47). In turn, Snow suggests that within the culture of science and technology, scientists behave and work in similarly predictable and efficient ways: "Without thinking about it, they respond alike" (p. 11).

How does Vonnegut in *Cat's Cradle* challenge and/or confirm this view of science in the mid-twentieth century?

# Student response (a humanities major)

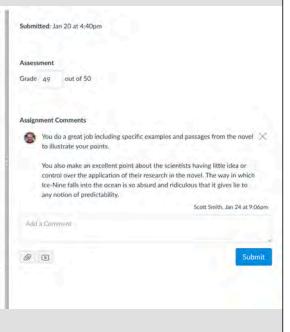


# Student response (a science major)

Paper View

Rather than acting in a linear, predictable manner, the scientists in Vonnegut's Cat's Cradle act erratically and whimsically. Felix Hoenikker, the novel's principal scientist, demonstrates this best. Jonah, while visiting the General Forge and Foundry Company in Illium, takes a detour with Miss Faust to visit the late Dr. Hoenikker's laboratory. He finds the workspace strewn with cheap toys: "a paper kite with a broken spine... a toy gyroscope, wound with string...a top... a bubble pipe" (56). For Hoenikker, science was not about making noble humanitarian strides. It seemed instead to be a pastime equivalent to a gyroscope or a bubble pipe – a source of meaningless, empty play. Indeed, the focus and efforts of his fascination could be shifted as easily as those of a toddler: by taking away his turtles, for example.

Compounding the association of science with volatility, the scientists in Cat's Cradle have no control over where their work ends up. The final destination for scientific inventions is unmitigated global catastrophe (the direct antithesis of improved human efficiency and quality of life). Asa Breed's son laments the futility of science—as Marvin Breed recounts, "He was all set up to be a heap-big re-search scientist, and then they dropped the bomb on Hiroshima and the kid quit, and he got drunk, and he came out here, and he told me he wanted to go to work cutting stone" (71). The ice-nine disaster is similarly unavoidable. Presented with "Papa" and Dr. Von Koenigswald's crystalline bodies, Frank Hoenikker sees a simple solution—"Listen, we've got to clean up this mess" (241). Despite his logical, well-planned efforts, the world becomes an uninhabitable wasteland in a matter of minutes.



# Short responses: one of Howell's

Set aside the engineering and personnel blunders made by billionaire John Hammond and his team in setting up a wildlife refuge filled with dinosaurs. **Assume the park is in fact safe for visitors.** 

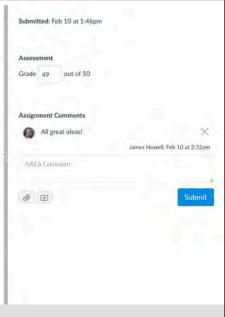
Also ignore the rather implausible reliance on amphibian DNA leading to sex-switching and breeding. **Assume** dinosaurs (as well as other animals and plants) are cloned healthy and sterile (unable to breed).

In ethical and scientific terms, what problems still remain? What else could go wrong?

# Student response (a humanities major)

Although the park is presumably safe and the animals are cloned to be healthy and sterile, the complications could include issues involving climate/environment, and also the fact that these animals/plants are being bred in the modern era. One might not necessarily think of the era as a problem, but the world/environment they initially inhabited was obviously different. Even though Isla Nublar is essentially isolated, there is no way of monitoring some of the organisms that decide to inhabit it, such as small migratory birds or insects. This may seem like a small issue, but it is a microcosm of the big picture. Even though there is a seemingly decent set-up of a food chain of some sorts, there are certain things that are out of Hammond and his team's hands. The modern animals that may decide to inhabit jurassic Park could essentially damage the island slowly, therefore could lead to the demise of the park. Also, the climate the dinosaurs lived in millions of years ago had to have been different, it certainly has not remained the same over all these years and the living conditions are incredibly different. Yes, the animals have been bred into this new environment but their genetic makeup may not actually allow them to flourish or live healthy lives.

The island itself is presumably large as well, but the fact that the animals are still confined to this small area as opposed to what they had originally inhabited, it poses the same problem that many zoos still face today. Ethically, for the health of the animals, just like a zoo, confining these large animals to this space will probably pose a problem in the future. Yes, they can always "create" more dinosaurs to replace those that die, but that could eventually become costly and perhaps reach a point where the expenses might not be worth it. Ethically, even though the park is safe for visitors, for the sake of the animals and other organisms, the future could perhaps hold a lot of mishaps and accidents due to how the animals deal with the climate and other things that are in their environments. The environment could even include issues regarding the hunting instincts the animals possess; the carnivores and omnivores probably will be fed with things OTHER than other dinosaurs, but if some are meant to hunt, it's not like those instincts will not be prevalent in their genes, as you cannot pick and choose certain genes/tendencies.



## Student response (a science major) Submitted: Feb 11 at 8:09am Although in this "perfect" scenario, the manmade plants and animals may not be able to breed, biology is never an isolated system. Creating an entirely new ecosystem, unless it was somehow perfectly contained, will inevitably have an effect on the Grade 50 out of 50 surrounding natural world. The new plants and animals may crowd out other species, or they may influence the food chain and flow of metabolites through the environment. The scientists would have practically no way of knowing how the microflora living in the park would adapt. What new microorganisms would arise from creating an entirely new **Assignment Comments** population of plants and animals? What if a new, pathogenic species of bacteria evolved Great ideas. in dinosaur guts and was carried out of the park by visitors? Perhaps this seems farfetched (does such a scenario violate the "safe for visitors" clause?), but interrupting the ecological balance has the potential to change the rest of the world in subtle, at first unseen, and ultimately irreversible ways. James Howell, Feb 13 at 4:39pm Ethically, real-life, sterile Jurassic Park would show a vast disregard for biodiversity and the current structure of nature as created by evolution. If humans can recreate any species, why do we need the Endangered Species Act (and we do need it. Republicans) or other stewardship policies? The ability to wantonly summon any species at will creates 0 D great opportunities to disregard the plants and animals we already have, opening up a potential catastrophe for global biodiversity.

# Discussion strategies

We primed discussions with a variety of preliminary exercises:

- Open questions at the start of class
   with our written summarizes and drawn connections on the chalkboard
- 2. **Incidental writings** at the start of class (instead of at the end)
- Small group discussions at the start of class
- Preliminary passages at the start of class modeling close reading and analysis (Smith's technique)

Distinguish, as you understand them now, the facts of evolution from the theory of evolution.

- Evolution is not linear

- All life began From one source Losingle cells

- Applarance clanges over times

- speciation can occur

> mating becomes more difficult

- Apres and hunger share a comman ancestor

- Relation to others in species As you understand it now, how does evolution work? What are the mechanisms by which new species

Evolution works as a means for a living being to adapt to it's climate or habitat. It is a slow process that works by reproducing of a species over a period of time as that species' world changes around it. This happens through the interchanging of genes and DNA. Passed on From the paternal and maternal figure

Distinguish, as you understand them now, the facts of evolution from the theory of evolution.

- · fossils, skeleton's of change.
- · organisms do adayot.
- · DNA segmences show relatability
- · dinasans on real.
- · dinosaws (some) evolved to

birds

- · racist
- . 50

- All humans share 1 common

thousands of years to

- numerous missing links

- Specialion takes Assi

- natural selection

- · all humans came from apes
- · apes came lesser species
- · from fish
- · from amoebas
- · mitosis can somehow produce new colls
- · Carbon dating is accurate
- · timeline

As you understand it now, how does evolution work? What are the mechanisms by which new species descend from old species?

evolution is the process of adaptation to a new environment. Species can develop resistances to certain dangers. They do that by altering their de DNA somehow, leading, eventually, to a new species altogether. This process is called natural selection.

A mommy sheep and a daddy sheep *love each other very much.* •• They put their bodies very close to one another and make a baby sheep. ••

- How does this sort of reproduction work—in terms of DNA, cells, maternal anatomy and physiology, and embryonic development?
- What is the relationship between the DNA of Mommy, Daddy, and Baby?
- · a sperm and egg find each other in the mom's fallopian tubes, producing a zygote. The cells start dividing in the uterus and attach to the uterine lining. Eventually a fetus will develop along with a placenta.
- · a baby is 50% from each parent

A hairless ape in a white lab coat has a state of the art molecular genetics lab and veterinary fertility clinic, a mommy sheep, and another female sheep named Fluffy. How—in terms of DNA, cells, maternal anatomy and physiology, and embryonic development—can the hairless ape create an exact genetic replica of Fluffy? (Bonus: What is the relationship between the DNA of Mommy, Fluffy, and Baby Fluffy?)

Hn exact replica could probably not be created due to the lack of mitochordria from the mother. Unless this is a case in which we discussed about the 3-farent baby, through then perhaps it could nork but the DNH wouldn't be identical.

A mommy sheep and a daddy sheep *love each other very much.* \*\* They put their bodies very close to one another and make a baby sheep. \*\*

- How does this sort of reproduction work—in terms of DNA, cells, maternal anatomy and physiology, and embryonic development?
- What is the relationship between the DNA of Mommy, Daddy, and Baby?

gametes from mether/father allow DNA to recombine
so that embryo has ~ 50%, mother DNA osof. father DNA
"Boing this genetic material, mather provides nutriente
t environment for embryo to develop

A hairless ape in a white lab coat has a state of the art molecular genetics lab and veterinary fertility clinic, a mommy sheep, and another female sheep named Fluffy. How—in terms of DNA, cells, maternal anatomy and physiology, and embryonic development—can the hairless ape create an exact genetic replica of Fluffy? (Bonus: What is the relationship between the DNA of Mommy, Fluffy, and Baby Fluffy?)

Jenetic ninterval from Fluffy. Embryo created artifes a ni same:

>> Fluffy/ baby Fuffy have exact same DNA; Ninte series.

Mommy is only a sucrogate with no general man

# Another entry prompt from Howell

What do you believe about vaccines? [climate change]
Why do you believe it?

It is a fact that you have neighbors and acquaintances with opposite views than your own about vaccines.

[climate change]

Why do you think they believe the opposite of what you believe?

# "The Two Cultures," The New Statesman (1956)

"... the scientific culture is expansive, not restrictive, confident at the roots, the more confident after its bout of Oppenheimerian self-criticism, certain that history is on its side, impatient, intolerant, creative rather than critical, good-natured and brash."

# "The Two Cultures," The New Statesman (1956)

The young English scientists still "stay pretty resilient: they are swept on by the same social force. Harwell and Windscale have just as much spirit as Los Alamos and Chalk River: the neat petty bourgeois houses, the tough and clever young, the crowds of children: they are symbols, frontier towns. There is a touch of the frontier qualities, in fact, about the whole scientific culture. Its tone is, for example, steadily heterosexual ... About the whole scientific culture, there is an absence – surprising to outsiders – of the feline and oblique."

# Charles Darwin, On the Origin of Species (1859)

As all the living forms of life are the lineal descendants of those which lived before the Silurian epoch, we may feel certain that the ordinary succession by generation has never once been broken, and that no cataclysm has devastated the whole world. Hence we may look with some confidence to a secure future of equally inappreciable length. And as natural selection works solely by and for the good of each being, all corporeal and mental endowments will tend to progress toward perfection.

# H. G. Wells, from "Zoological Retrogression" (1891)

Perhaps no scientific theories are more widely discussed or more generally misunderstood among cultivated people than the views held by biologists regarding the past history and future prospects of their province—life. Using their technical phrases and misquoting their authorities in an invincibly optimistic spirit, the educated public has arrived in its own way at a rendering of their results which it finds extremely satisfactory. It has decided that in the past the great scroll of nature has been steadily unfolding to reveal a constantly richer harmony of forms and successively higher grades of being, and it assumes that this "evolution" will continue with increasing velocity under the supervision of its extreme expression—man.

# H.P. Lovecraft, "The Call of Cthulhu" (1928)

The most merciful thing in the world, I think, is the inability of the human mind to correlate all its contents. We live on a placid island of ignorance in the midst of black seas of infinity, and it was not meant that we should voyage far. The sciences, each straining in its own direction, have hitherto harmed us little; but some day the piecing together of dissociated knowledge will open up such terrifying vistas of reality, and of our frightful position therein, that we shall either go mad from the revelation or flee from the deadly light into the peace and safety of a new dark age.

# Margaret Atwood, "Writing Oryx and Crake" (2003)

Oryx and Crake is a speculative fiction, not a science fiction proper. It contains no intergalactic space travel, no teleportation, no Martians. As with The Handmaid's Tale, it invents nothing we haven't already invented or started to invent. Every novel begins with a what if, and then sets forth its axioms. The what if of Oryx and Crake is simply, What if we continue down the road we're already on? How slippery is the slope? What are our saving graces? Who's got the will to stop us?

# Making adjustments

Unanticipated, productive interaction between instructors

Hard to plan for! Lesson plans cannot be fully scripted.

Students noticeably responded to this dynamic!

Howell made a **major shift from lecture towards discussion** (of science topics), responding to Smith's (humanities, discussion-based) teaching style.

# Assessing the course

- Informal mid-term written feedback
- 2. Final meeting discussion ("course wrap-up")
- 3. Creamery **focus groups** before finals week (three meetings: Howell + 3, Howell + 3, Smith + 4)

Strong consensus among these three methods of gathering feedback.

# Student feedback

### **Possible improvements**

- Expand genres to include:
  - 1. Short stories
  - 2. More science writing
  - 3. Journalism (including attention to policy issues)
  - 4. Television episodes
- Provide more diverse representation of science and science issues (less 'science is bad')
- Devote more time to climate change

# Student feedback

### **Possible improvements**

- Revision opportunities for term paper peer review OR instructor feedback on an initial draft
- Provide more time to complete "short response" assignments
- Provide discussion questions prior to literature meetings
- Provide pre-lecture material for science meetings, outlining base concepts
- Less time on the atomic bomb (or, less material generally)

# Student feedback

### Things that worked

- Range of texts and media
- Starting with C.P. Snow's "The Two Cultures"
- Small class size was beneficial
- Small group discussions prior to full class discussion
- Incidental writings were productive
- Students appreciated open discussions, including (especially?) disagreements between instructors

What do you believe about vaccines?

Vaccines are miracles. They have prevented the death of millions of individuals. We have successfully eradicated horrible, dibilatating diseases like smallgox in developed countries. Yes, shots suck. But in the end at worth more not to die from a horrible disease.

Why do you believe it?

My nother is a doctor and I am a scientist who has seen the Benefit and power of vaccines to save people. The science Behind it is perfectly logical. I had a Childhood friend who was severely hospitalized with a totally preventable disease, but he garents refused to vaccinate her.

It is a fact that you have neighbors and acquaintances with opposite views than your own about vaccines. Why do you think they believe the opposite of what you believe?

Because they are ignorant and stuged and believe intive crap that they hear in the media.

- Riggest nusconception is that vaccines are the cause of

that can violate someone's religious views. Also come religions from your vaccines.

# What do you believe about vaccines?

I believe that vaccines are a necessity, because it allows us to build our ammune system, and protect us from diseases that would otherwise kill us. It helps fight and prevent the spreading of diseases

# Why do you believe it?

The reason I believe that vaccines are a must, is because of history. History has proven that vaccines prevent diseases from killing humans & spreading. For instance, the flu use to kill hundreds - thrusands of prople in one area before on vaccine was created.

It is a fact that you have neighbors and acquaintances with opposite views than your own about vaccines. Why do you think they believe the opposite of what you believe?

I think others believe the opposite of what I believe because they fear what they don't understand. There is a possibility that vaccines that a disease will. I think that individuals also feel that they are having their freedom taken from them. And as an individual that has no say in what vaccines I get because of the military, I can understand that.

What did you learn during today's discussion? What questions do you have after today's discussion? I learned about how little Darwin knew when he made his theory and what he used to back it up. (I already knew the rest since I am a biotech major : P)

I would still like to know more about what causes evolution to not occur gradually (Hex gere mutations, catastrophs, etc.)

On the first day of class, we asked you what you hoped to get from this course. Are you getting what you

hoped you would get? Give examples.

This class is giving me almost exactly what I hoped for. A set of literature that shows how science was viewed by society and how science has counter the projects evolved over time. The Manhatten Projects and Snow's theory showed society's views while Darwin's work showed how it changed.

Please take a moment to tell us what we are doing well in this course, and what we could do in order to

improve this course.

The choice of books and presentations has been great! The only thing I would ask for is for some more modern (20stronto) views on science. Well-

What did you learn during today's discussion? What questions do you have after today's discussion?

• Clarification/differentiations between facts, theory, and

Michanisms

that we can observe changes over time: i.e., panda discussion

On the first day of class, we asked you what you hoped to get from this course. Are you getting what you hoped you would get? Give examples.

so four, yes. Myproson em some things (the scientific discussions) can be confusing, but they are definitely interesting. I like the class mostly because it applies science to the humanities, making the content more interesting. It's a nice change to be reading science-y related literature as opposed to trading about general topics/branches of English, i.e. 18th c. British lit or American Dystopian fiction.

Please take a moment to tell us what we are doing well in this course, and what we could do in order to improve this course.

the lecturing style is solid, I like how you guys alternate who electures, it was makes it easier to understand lkeep up with what's going on. The participation assignments on canvas seem to be working pretty well too.