HPSC0092 Responsible science and innovation

Course Syllabus

2018-19 session | Dr Jack Stilgoe | j.stilgoe@ucl.ac.uk

Course description

Science, technology and innovation have huge potential for both benefit and harm. With power should come responsibility, but history is littered with cautionary tales that suggest that innovation is a form of 'organised irresponsibility'. Should we expect more from scientists? Should we hold them responsible for failures of policy or technological catastrophes? Are there ways to steer and improve technologies while they are still emerging? In this course, we will look at rationales and methods for making science and innovation more responsible. We will look at the responsibilities scientists might have to their profession and the wider world, as well as how these change when they are 'in public', as experts, innovators or communicators. Looking back at case studies of technological failure and scientific misdemeanour, as well as ahead to emerging topics such as geoengineering, self-driving cars and gene editing, we use ideas from ethics, sociology of science, and science policy studies to consider what it means for science and innovation to develop responsibly.

Basic course information

Moodle Web site:	HPSC0092
Assessment:	Coursework 1 (a pair of blog posts, total 2,500 words) Coursework 2 (essay 2,500 words) (50% each)
Timetable:	www.ucl.ac.uk/sts/hpsc
Prerequisites:	No pre-requisites
Required texts:	No required texts. Each week there are two or three essential readings
Course tutor(s):	Jack Stilgoe
Contact:	j.stilgoe@ucl.ac.uk
Web:	www.ucl.ac.uk/sts/staff/stilgoe
Office location:	22 Gordon Square, Room 2.4
Office hours:	Tuesdays 11am-1pm

Schedule

UCL Week	Topic	Date	Activity
6	Science and social responsibility	2 Oct	Do the essential reading before each
7	Frankenstein	9 Oct	
8	Responsible innovation	16 Oct	Draft blog post due to be shared 19 Oct
9	Risk	23 Oct	
10	Inequality	30 Oct	Blog posts due 2 Nov
11	**Reading Week**		No class
12	Resistance **(Guest lecturer Dr Cian O'Donovan)**	13 Nov	
13	Consent **(Guest lecturer Prof Sarah Edwards)**	20 Nov	
16	Funding **(Guest lecturer Prof Graeme Reid)**	27 Nov	
15	Hype	4 Dec	
14	Openness	11 Dec	Essays due 12 Dec

Assessments

	Description	Deadline	Word limit	Feedback by
Blog posts	Draft blog post (via email to j.stilgoe@ucl.ac.uk) Both blog posts (via Moodle)	5 pm, Fri 19 Oct 5 pm, Wed 31 Oct	Total 2,500	02/11/2018 14/11/2018
Essay	See titles below	5 pm, Wed 9 Dec	2,500	12/01/2019

Assignments

In order to be deemed 'complete' on this module, students must attempt the blog posts and the essay. The pair of blog posts and the essay must be submitted via Moodle.

Blog posts

Initial drafts of the blog posts should be shared with the class - ideally published online – so that they can be read and commented upon by others. Students should be prepared to discuss their blog posts in class and to provide and receive feedback from others.

Blog posts should be fully hyperlinked.

We will discuss in class what makes for a good blog post, and students will be supported in their writing. Students will in general be expected to demonstrate that they have understood the ideas and approaches of the course and are able to apply them in a readable way to topical and emerging issues. They will be expected to research issues online and demonstrate this with hyperlinks. Students will be assessed on style as well as substance. The assumption will be that students' blogging skills develop over the course of the term, with help from their colleagues.

The fist blog post will not be given a mark when first submitted, but feedback will be provided so that the post can be redrafted for final submission. Students are also encouraged to discuss blog post ideas with the course tutors.

Feedback on blog posts and provisional marks will be returned two weeks after the deadline.

Essay Titles

1. What can Mary Shelley's Frankenstein teach us about the regulation of genome editing?
2. How might self-driving cars be considered a social experiment? How could this view change how they are governed?
3. Polanyi says that science advances ''only by essentially unpredictable steps, pursuing problems of its own". Collingridge says that technologies are inherently unpredictable. Does this mean we should give up on trying to steer them? Discuss using one or two case studies?
4. Should we expect technology to solve the problem of climate change?
5. Why and how should the UK government fund science?

(Students are free to suggest their own alternative essay topics, but they must be agreed with the course tutor)

Criteria for assessment

The departmental marking guidelines for individual items of assessment can be found in the STS Student Handbook.

Blogs

Above these criteria, the blog posts will also be marked for the accessibility and clarity of their writing in blog posts.

Essay

In addition to the criteria indicated in the STS Student Handbook, the following are the main criteria on which your essay will be marked. There are no set numbers/ percentages associated with these criteria but we will give you qualitative feedback based on them.

1. Answer the question
Read the question carefully and answer it specifically – do not give irrelevant material or drift into answering other questions.

2. Organisation
Is the essay organized into an introduction, main body and conclusion? Does each part flow naturally into the next one? Is the evidence in a logical order? Using signposting sentences (in this section I will argue that…) will help.

3. Introduction
You should give an introduction to your essay in no more than one or two paragraphs. Introduce your topic and your line of argument, no more. Good introductions are concise and precise.

4. Clarity
We place great emphasis on clarity of argument and expression. Avoid ambiguity and vagueness. Do not assume your reader already knows what you are talking about. Try to keep your line of argument clear. It often helps clarity to divide the main body of the essay into sections (typically three or four for a 2500 word essay). Accurate spelling, grammar, punctuation and simple, active sentence structure also improve clarity.

5. Argumentation
Is the main argument of the essay clear, coherent and persuasive? Is it properly supported by the evidence available?

6. Conclusion
Your essay should have a conclusion that is clearly marked as such (new paragraph, 'In conclusion…'). It should be substantial in summing up what you have argued and exploring the implications of what you have argued.

7. Reading/ use of sources
How well have the readings and other resources been used? Does the essay reflect them accurately? Is the essay overly dependent on one source?

8. Independent critique?
Does the essay offer some independent critique or thought on the question or does it merely report what is in the literature? In Masters-level courses this is an essential component of essays.

9. Referencing
You must reference all quotes and all references/ summaries of books, etc. Pick one system for referencing and stick to it. Refer to individual page numbers, not just whole texts, whenever possible. Making use of ideas from or paraphrasing material without clearly referencing the original source is plagiarism and has incurs serious penalties.

10. Bibliography
You need to supply a bibliography of all works referenced at the end of your essay. You must supply author, title, date, place of publication and publisher.

Aims & objectives

The aim of this course is to get students to think and write critically about the relationship between science and society and the role and responsibility of scientists within that. In particular, we will give thought to the practices, politics and policies of science and innovation, taking into account social, political, economic and ethical questions. By the end of this course, students will be familiar with a number of case studies and theories of science policy and governance, particularly the recently emerged idea of responsible research and innovation (RRI) and they will be able to apply the lessons from these more widely. The idea is to study concepts and cases in class and apply them to new areas at the frontiers of science and innovation through students' own writing. In addition to assessment via essay, the course also asks students to write accessibly and publicly, via a blog.

Format of classes

Each class will be a mix of lecture and discussion to explore the issues presenting in the lecture and the readings more fully. Students may be asked to sign up to lead discussions, so please be prepared (and informed) to speak.

Reading list

These are **essential** readings for discussion in class. Please make sure that you have read and are able to talk about them as you will be called upon in class. If you have time, you should also read the **recommended** pieces. It is also expected that you will explore additional material to inform your blogs, essays and class discussions.

Additional readings, referred to in lectures and to inform discussion, blog posts and essays, will be put on Moodle**.**

1. Science and social responsibility

Essential reading

- Heather Douglas. 2003. The moral responsibilities of scientists (tensions between autonomy and responsibility). American Philosophical Quarterly, 59-68. http://www.jstor.org/discover/10.2307/20010097?uid=2129&uid=2&uid=70&uid=44&sid=21101531219477
- Dan Sarewitz. 2016. Saving Science, The New Atlantis. http://www.thenewatlantis.com/publications/saving-science

Recommended reading

- Science must acknowledge its past mistakes and crimes, Nature Editorial, 4 Sept 2017, http://www.nature.com/news/science-must-acknowledge-its-past-mistakes-and-crimes-1.22557
- John Ziman. 1998. Why must scientists become more ethically sensitive than they used to be? Science, 4 December 1998: Vol. 282 no. 5395 pp. 1813-1814, DOI: 10.1126/science.282.5395.1813 http://www.sciencemag.org/content/282/5395/1813
- Joshua A. Ettinger and Jessica M. Wyndham (2015) Investigating the Perceived Social Responsibilities of Scientists, Engineers and Health Professionals https://www.aaas.org/news/investigating-perceived-social-responsibilities-scientists-engineers-and-health-professionals
    - Full report here: https://www.aaas.org/report/social-responsibility-preliminary-inquiry-perspectives-scientists-engineers-and-health

- Listen to BBC Radio 4 'The Moral Maze: is science morally neutral?' (12 March 2016) http://www.bbc.co.uk/programmes/b072mz5r
- Listen to BBC Radio 4 'Ethical science' (6 Oct 2013) http://www.bbc.co.uk/programmes/b03bsbbd
- Listen to Copenhagen, the radio play https://www.youtube.com/watch?v=B0jVjuPF9ZE

2. Frankenstein

Essential reading

- Langdon Winner, 1977, 'Frankenstein's Problem', Ch. 8 in Autonomous Technology https://www.ratical.org/ratville/AoS/AutonomousTechnology.pdf
    - (Also read the first few pages of the book to get a feel for his argument)
- Bruno Latour, 2011, 'Love your monsters' The Breakthrough journal, https://thebreakthrough.org/index.php/journal/past-issues/issue-2/love-your-monsters
    - (Read the first bit, on Frankenstein and responsibility)

Additional reading

- Stilgoe, J., Watson, M., & Kuo, K. (2013). Public engagement with biotechnologies offers lessons for the governance of geoengineering research and beyond. PLoS biology, 11(11), e1001707.
- Doctorow, C (2017). I've Created a Monster! And so can you. Slate. http://www.slate.com/articles/technology/future_tense/2017/05/sci_fi_doesn_t_predict_the_future_it_influences_it.html
- Bicentennial edition of Frankenstein, including some brilliant new essays, https://www.dropbox.com/s/v3p2b1cz2emw9f0/10815.pdf?dl=0
- Two of my Guardian pieces

- https://www.theguardian.com/environment/2015/apr/10/can-volcanoes-tackle-climate-change-frankenstein-mount-tambora
- https://www.theguardian.com/science/political-science/2016/jun/16/what-frankenstein-means-now
  - (Introduces the 1975 Asilomar meeting, which we will come to later)

3. Responsible innovation

Essential reading

- David Collingridge, 1980, The Social Control of Technology, Open University Press, Chapter 1, pp. 13-21 (available on Moodle)
- Dave Guston. 2008. Innovation Policy: Not Just a Jumbo Shrimp. Nature 454:940-41, http://www.nature.com/nature/journal/v454/n7207/full/454940a.html

Recommended reading

- Ch. 1 – The Power of Technology, in Jasanoff, S. (2016). The Ethics of Invention: Technology and the Human Future. WW Norton & Company.
- Dan Sarewitz and Richard Nelson, 2008, 'Three rules for technological fixes', Nature, 2008, http://thebreakthrough.org/blog/Sarewitz-Nature%20tech%20fix.pdf
- M. Polanyi. 1962. "The Republic of Science," *Minerva* 1:54-73. http://sciencepolicy.colorado.edu/students/envs_5100/polanyi_1967.pdf
- J Stilgoe and D Guston, 2016. Responsible Research and Innovation, CH. 29 in The Handbook of Science and Technology Studies, MIT Press
- Stilgoe, J (2018) Machine learning, social learning and the governance of self-driving cars, *Social Studies of Science 48, no. 1 (2018): 25-56.*

<u>On Asilomar</u>

- Michael Rogers, 1975, The Pandora's Box Congress, Rolling Stone magazine, June 19th 1975 http://web.mit.edu/endy/www/readings/RollingStone(189)37.pdf
- Dorothy Nelkin. 2001. Beyond risk: reporting about genetics in the post-Asilomar press. Perspectives in Biology and Medicine https://muse.jhu.edu/journals/perspectives_in_biology_and_medicine/v044/44.2nelkin.pdf
- Hurlbut, J. B. (2015). Limits of responsibility: genome editing, Asilomar, and the politics of deliberation. Hastings Center Report, 45(5), 11-14.

4. Risk

Essential reading

- Beck, U. (1998). Politics of Risk Society. In J. Franklin (Ed.), The Politics of Risk Society (pp. 9–22). Cambridge: Polity Press. https://mycourses.aalto.fi/pluginfile.php/415736/mod_resource/content/1/u_beck_11-05_Politics-of-risk-society.pdf
- European Environment Agency, 2002, Late lessons from early warnings, Chapter 1:

Introduction.
http://www.eea.europa.eu/publications/environmental_issue_report_2001_22

- Charles Perrow, 1981, 'Normal Accident at Three Mile Island', Society, Volume 18, Number 5, 17-26, http://www.penelopeironstone.com/Perrow.pdf

Recommended reading

- Ch. 2 – Risk and responsibility, in Jasanoff, S. (2016). The Ethics of Invention: Technology and the Human Future. WW Norton & Company.
- Sheila Jasanoff, "Technologies of Humility: Citizen participation in governing Science,", Minerva 41:223-244, http://www.hks.harvard.edu/sdn/articles/files/Jasanoff-Humility.pdf (for a quick digest of this, have a look here http://2020science.org/2008/12/24/a-manifesto-for-socially-relevant-science-and-technology/)

- Watch: New York Times video: Major Malfunction: Revisiting Challenger http://nyti.ms/1tAQ6Rp

5. Inequality

Essential reading

- Andrew Russell and Lee Vinsel, 2017, Whitey on Mars, Aeon, https://aeon.co/essays/is-a-mission-to-mars-morally-defensible-given-todays-real-needs
- Woodhouse, E., and D. Sarewitz. 2007. Science policies for reducing societal inequities, Science and Public Policy 34 (2): 139–150. https://academic.oup.com/spp/article/34/2/139/1689094

Recommended reading

- Richard Nelson. 2011. The Moon and the Ghetto revisited, Science and Public Policy, 38(9), November 2011, pages 681–690
- Melissa Leach and Ian Scoones, 2007, The Slow Race: Making technology work for the poor, London, Demos, http://www.demos.co.uk/files/The%20Slow%20Race.pdf
- Smallman M (2015) Can science be the solution if it is part of the problem? Guardian Political Science Blog. https://www.theguardian.com/science/political-science/2015/feb/09/can-science-be-the-solution-if-it-is-part-of-the-problem

6. Resistance (Guest lecturer Dr Cian O'Donovan)

Readings (tbc)

7. Consent (Guest lecturer Professor Sarah Edwards)

Essential reading

- Miller, F. G., & Wertheimer, A. (2011). The fair transaction model of informed consent:

an alternative to autonomous authorization. Kennedy Institute of Ethics Journal, 21(3), 201-218.

Recommended reading (tbc)

8. Funding (Guest lecturer Professor Graeme Reid)

Essential reading

- Reid, G (2014) Why should the taxpayer fund science and research? National Centre for Universities and Business, 2014, http://www.ncub.co.uk/index.php?option=com_docman&view=download&category_slug=reports&alias=180-why-should-the-taxpayer-fund-science-and-research&Itemid=2728
- Jones, R and Wilsdon, J (2018) The biomedical bubble: Why UK research and innovation needs a greater diversity of priorities, politics, places and people, https://www.nesta.org.uk/report/biomedical-bubble/

Recommended reading

- Mazzucato, M (2013). *The entrepreneurial state : debunking public vs. private sector myths*. Anthem Press, London. Read just the Introduction: Do something different. Pages 1-13.
- Caroline Wagner, 2008, The new invisible college: Science for development, Brookings institution press, chapter 1, available online, http://www.brookings.edu/~/media/press/books/2008/newinvisiblecollege/newinvisiblecollege_chapter.pdf
- The Scientific Century –Securing out future prosperity, Royal Society, 2010 http://royalsociety.org/The-scientific-century/

9. Hype

Essential reading

- Mads Borup, Nik Brown, Kornelia Konrad & Harro Van Lente (2006): The sociology of expectations in science and technology, Technology Analysis & Strategic Management, 18:3-4, 285-298 http://dx.doi.org/10.1080/09537320600777002
- Sheila Jasanoff, J. Benjamin Hurlbut, Krishanu Saha (2015). CRISPR Democracy: Gene Editing and the Need for Inclusive Deliberation. Issues in Science and Technology http://issues.org/32-1/crispr-democracy-gene-editing-and-the-need-for-inclusive-deliberation/

Recommended reading

- Guston, D. H. (2012). The Pumpkin or the Tiger? Michael Polanyi, Frederick Soddy, and Anticipating Emerging Technologies. Minerva, 1-17. http://www.springerlink.com/content/28558183856r34j1/
- Mike Fortun, 2005, 'For An Ethics of Promising, Or, A Few Kind Words About James

Watson.' New Genetics and Society 24/2:157-173 http://www.tandfonline.com/doi/abs/10.1080/14636770500184792

- Nathaniel Comfort, 2016. Why the hype around medical genetics is a public enemy, Aeon, https://aeon.co/ideas/why-the-hype-around-medical-genetics-is-a-public-enemy

10. Openness

Essential reading (on 'Climategate')

- Grundmann, R. (2013). "Climategate" and the scientific ethos. Science, Technology, & Human Values, 38(1), 67-93.
- Hulme (2013) Extract from Chapter 50 in Exploring climate change through science and in society: an anthology of Mike Hulme's essays, interviews and speeches, Routledge, chapter available here http://www.mikehulme.org/wp-content/uploads/2013/06/Extract-from-Chapter-50-Climategate.pdf
- Hulme, M and Ravetz, J (2009) Show Your Working: What Climategate means, BBC News http://news.bbc.co.uk/1/hi/8388485.stm

Recommended reading

On Open Access

- Peter Suber, 2012, Open Access, Chapter 1, free online here http://mitpress.mit.edu/sites/default/files/titles/content/9780262517638_Open_Access_PDF_Version.pdf

On Open Science

- Michael Nielsen, Reinventing Science, Chapter 1, free online here http://press.princeton.edu/chapters/s9517.pdf

Course expectations

In addition to submitting assessed material, students are expected to attend all classes. They are expected to have read the essential (and ideally recommended) reading before each class and be willing to discuss the literature and the lecture. Students are expected to conduct online research into areas of new technology. Students are also expected to publish blog posts online so that they can be read by other members of the class.

Important policy information

Details of college and departmental policies relating to modules and assessments can be found

in the STS Student Handbook www.ucl.ac.uk/sts/handbook

All students taking modules in the STS department are expected to read these policies.