

HPSC0009 Revealing Science

Course Syllabus

2019-20 session | Dr Chiara Ambrosio c.ambrosio@ucl.ac.uk

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This module provides an engaging introduction to the history, philosophy, and social studies of science, including key concepts in science and technology studies, public engagement with science, and science policy. Using historical and contemporary case studies, the focus of this module is to encourage students to develop their skills as independent, interdisciplinary and publicly engaged scholars. This course is intended as a foundation and sampler for later courses in Science and Technology Studies. Students attend one lecture and one seminar per week.

Basic course information

Moodle Web site:	https://moodle.ucl.ac.uk/course/view.php?id=7418
Assessment:	Three pieces of coursework: 10% Individual annotated bibliography 60% - Individual essay (2,500 words) 30% - Group engagement piece (1,500 words)
Timetable:	www.ucl.ac.uk/sts/hpsc
Prerequisites:	No prerequisites
Required texts:	See reading list below and online reading list via Moodle
Course tutor(s):	Course convenors: Dr Chiara Ambrosio, Dr Erman Sozudogru Teaching assistants: Edward Bankes (edward.bankes.09@ucl.ac.uk), Santiago Guzmán Gámez (santiago.gamez.15@ucl.c.uk)
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Ambrosio office hours:	Monday 14:00-16:00
Sozudogru office hours:	Monday: 14:00-15:00 Wednesday: 11:00-12:00

Schedule

UCL Week	Lecture Date	Lecture Topic	Tutorial Date	Tutorial: skills and activities [Note: 20 mins of each tutorial will be spent discussing the readings assigned for each session]
Part 1 – What Makes a Scientist?				
6	30/09/19	Welcome and course overview	30/09; 1/10 2019	<i>Reading a paper, identifying a thesis statement</i>
7	7/10/19	What Makes a Scientist? The Philosopher's Answer	7-8/10/19	<i>Reading a paper, identifying a thesis statement. Critical thinking: how would you write an argument?</i>
8	14/10/19	What Makes a Scientist? The Historian's Answer	15-16/10/18	<i>Identifying sources and referencing</i>
9	21/10/19	What Makes a Scientist? The Sociologist's Answer	22-23/10/18	<i>Analysing and using case studies. Exercise: how to reference; how to write a bibliography</i>
	25/10/2019	Submit your list of references by 12.00 (midday)		
10	28/10/19	Taking stock: the story so far, assessment criteria and essay troubleshooting	28-29/10/18	<i>Bibliography assessment presentations</i>
10	28 or 29/10/2019	Bibliography Presentations (during tutorials)		
11	4-8/11/19	Reading Week – no lectures		
Part 2: Doing STS in the Real World				
12	11/11/19	Ethics Matters!	11&12/11/19	<i>How to write an essay – last minute troubleshooting!</i>
	13/11/19	Essay Deadline 5pm		
13	18/11/19	Toward a More	18&19/11/19	<i>Writing in different registers</i>

		Diverse Science?		<i>for different audiences – Science in blogs and websites</i>
14	25/11/19	Picturing Science	25&26/11/19	<i>Researching images and writing about them</i> <i>Blog groups finalised</i>
15	2/12/19	Policy, Experts and Social Change	2&3/12/19	<i>Find/discuss your blog topic</i>
16	9/12/19	STS and The Meaning of Life	9&10/12/19	<i>Learning to be constructive in peer review: comment on each other's draft blog</i>
16	12/12/19	Group blog deadline, 5pm		

Assessments

	Description	Deadline	Word limit
10% of total mark (pass or fail)	Individual annotated bibliography	Submit your references by 12.00 (midday) Friday 25 October ; presentations during Tutorials 28/29 October	Oral presentation, 2 minutes
60%	Individual essay	5pm, 13 November 2019	2,500 Words
30%	Group blog	5pm, 12 December 2019	1,500 Words

Coursework

All the coursework for this module is tailored around developing *studying, writing, and research skills*. You will start by learning the basics: how to locate, read, and annotate your sources. You will also be asked to briefly explain their relevance in an oral form (Assessment 1). You will then move on to academic writing (Assessment 2), and will develop a coherent argument on one of the suggested essay topics. Lastly, you will experiment with a different writing style aimed at a non-academic audience, in the form of a blog (Assessment 3). Please note that for the blog you will have to work in small groups (3 people): you will research a topic and write the blog together. More instructions on groupwork will be provided in the tutorials.

Detailed instructions on each assessment component is available on Moodle, in the Assessment section.

Criteria for assessment

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

Aims and Objectives

Aims

The aim of this course is to provide students with an overview of foundational concepts, debates and methodologies in the field of Science and Technology Studies. Combining content and skill-building, the course will equip students with conceptual and methodological foundations to pursue further studies in history, philosophy, and social studies of science.

Learning Outcomes

On successful completion of this course students should be able to:

1. Understand and apply fundamental concepts in History, Philosophy and Social Studies of Science;
2. Analyse a scholarly text, identifying and assessing its key thesis;
3. Research independently, locating literature and case studies and evaluating their relevance in relation to a specific research question;
4. Build a sound argument, justifying its main claims through evidence from the literature;
5. Test the validity and limitations of HPS/STS concepts against independently researched historical or contemporary case studies;
6. Understand and apply the difference between academic and popular writing, tailoring arguments to different kinds of audiences.

Reading List

Background readings

General background texts for this module include:

- Lisa Bortolotti, *An Introduction to Philosophy of Science*. Cambridge: Polity, 2008.
- Alan Chalmers, *What is This Thing Called Science?* Maidenhead: Open University Press, 1999 (3rd Edition).
[note: there are various editions of Chalmers, you can choose any from the 3rd edition onward]
- Harry Collins and Trevor Pinch, *The Golem: What you Should Know about Science*. Cambridge: Cambridge University Press, 1998 (2nd edition).
- Mark Erickson, *Science, Culture and Society: Understanding Science in the 21st Century*. Cambridge, UK; Malden MA.: Polity Press 2016 (2nd Edition).
- Patricia Fara, *Science: A Four Thousand Year History*. Oxford: Oxford University Press, 2009.
- Peter J. Bowler and Iwan Rhys Morus, *Making Modern Science: A Historical Survey*. Chicago: University of Chicago Press, 20

Weekly schedule and readings

Lecture 1 – Monday 30 September

Welcome and overview of the course

This session will introduce the field of Science and Technology Studies. We will start thinking critically about science and its place in society, and explore how STS will allow you to dissect, evaluate and contextualise the legitimacy and authority of science in society and culture. We will also cover a lot of practical information about the course, its aims and objectives, and your coursework and assessments.

Recommended Readings:

This week you will be busy understanding the practicalities of student life, so the readings assigned are two chapters from books that we will use throughout this term. As you will see, these chapters will come back as suggested readings in subsequent sessions; however it would be good to start reading them in preparation for the first lecture of this module.

Chalmers, A. (1999) *What is this thing called science?* 3rd edition. Open University Press [chapter 1].

OR

Mark Erickson, *Science, Culture and Society: Understanding Science in the 21st Century*. Cambridge, UK; Malden MA.: Polity Press 2016 (2nd Edition) [chapter 1].

In the tutorial you will start looking at the reading for next week:

Peter Medawar, "is the Scientific Paper a Fraud?", in Peter Medawar, *The Strange Case of the Spotted Mice*, Oxford: Oxford University Press, 1996, pp. 33-39.

Part 1 – What Makes a Scientist?

The first part of this module will look at a crucial question in History, Philosophy and Social Studies of Science: how do we demarcate science from non-science? We will tackle the question via the construction of scientific identity, looking at how philosophers, historians and sociologists have differently investigated how scientists draw boundaries between their own practices and knowledge and other human activities.

Lecture 2 – Monday 7 October

What Makes a Scientist? The Philosopher's Answer

“Science is identified by its method”: this has been a long standing common-sense view among practicing scientists, as well as in popular portrayals of scientific practice. In this section we will explore how some leading philosophers of science have tackled the question of “the” scientific method – and we will see that in doing so they set the foundations for the field of philosophy of science, at the same time constructing a portrayal of ‘the scientist’ that had lasting effects on practitioners themselves.

Essential Readings

Peter Medawar, “is the Scientific Paper a Fraud?”, in Peter Medawar, *The Strange Case of the Spotted Mice*, Oxford: Oxford University Press, 1996, pp. 33-39.

Karl Popper, “The Problem of Induction” in Martin Curd and J.A.Cover, *Philosophy of Science: The Central Issues*. New York and London: Norton, 1998, pp. 426-432.

[Note: there is a second edition of this anthology, which you can also use].

In preparation for the seminar, answer the following questions:

Who was Peter Medawar?

Does he have a connection with UCL, and if so what is it?

What was his relationship with Popper?

What is the main connection between Medawar and Popper's short papers?

Further Readings:

Lisa Bortolotti, *An Introduction to Philosophy of Science*. Cambridge: Polity, 2008.

Chalmers, A. (1999) *What is this thing called science?* 3rd edition. Open University Press [especially chapters 1, 4 and 5. Chalmers has also individual chapters on each of the philosophers we will discuss in the lecture]

Mark Erickson, *Science, Culture and Society: Understanding Science in the 21st Century*. Cambridge, UK; Malden MA.: Polity Press 2016 (2nd Edition) [especially chapters 1 and 3].

Each philosopher discussed in class has an entry in the Stanford Encyclopaedia of Philosophy, which is a very useful online resource for any philosophy module you will take in the future:

<https://plato.stanford.edu/>

Lecture 3 – Monday 14 October

What makes a scientist? The Historian's answer

The word “scientist” is relatively recent. In this session we will examine the historical context and circumstances in which this term was introduced, and use this episode in the history of science to think

about historiography and historical methods.

Essential Readings

Anonymous [William Whewell], "'On the Connexion of the Physical Sciences', By Mrs Somerville". *The Quarterly Review*, vol. 51, 1834, pp. 54-68.

Available via Hathi Trust, here: [https://babel.hathitrust.org/cgi/pt?id=uc1.\\$b661406&view=1up&seq=64](https://babel.hathitrust.org/cgi/pt?id=uc1.$b661406&view=1up&seq=64) (the text starts half way through the page, so scroll down and you will find it!). The article is quite long – pay special attention to the introduction (pp. 55-56), pp. 58 (last paragraph) – 60, and pp. 64 to the end.

James Secord, "Mary Somerville's Vision of Science", *Physics Today*, vol. 71 no. 1, pp. 46-52.

In preparation for the seminar, answer the following questions:

Who was William Whewell?

Who was Mary Somerville?

In what ways does Whewell's text differ from the text by Peter Medawar you read last week?

Is his treatment of Somerville and of other women in science fair?

Think about the online platform you used to access Whewell's text. What do you think is Hathi Trust? How will you be able to use it in your future research? Can you locate similar online resources?

Think about the essay by James Secord assigned as a companion to Whewell's text. In what kind of journal is it published? Who is Secord's audience? How is this article different from the book chapter from which it is taken (see further readings), or any other academic works you can locate on Somerville's life and work?

Further Readings:

James Secord, *Visions of Science: Books and Readers at the Dawn of the Victorian Age*, Chicago: The University of Chicago Press, 2014 [chapter 4]

Lecture 4 – Monday 21 October

What Makes a Scientist? The Sociologist's Answer

Demarcating science from non-science is more than just an analytical exercise. When looked at from the perspective of practicing scientists, the issue of demarcation reveals that the reasons why scientists erect boundaries and divisions to separate their activities from other kinds of human enterprises are often ideological. In this session we explore how some key authors in the sociology of science can help us probe the complex relationship between science, power, institutions, and values.

Essential Reading

Thomas Gieryn, "Boundary-Work and the Demarcation of Science from Non-Science: Strains and Interests in Professional Ideologies of Scientists", *American Sociological Review* vol. 48 no. 6, pp. 781-795.

In preparation for the seminar, answer the following questions:

Who was John Tyndall?

What is phrenology?

What connects the three apparently unrelated case studies in the article?

What counts as evidence in Gieryn's article? How does Gieryn use evidence in support of his claim?

Observe carefully how Gieryn uses references in his work. Can you spot a pattern connecting citations in the text and entries in the bibliography?

How are citations and direct quotes used in the construction of an argument?

Can you differentiate primary and secondary sources in the text?

Can you differentiate Gieryn's sources from his own interpretative layer and argument?

Further readings

Mark Erickson, *Science, Culture and Society: Understanding Science in the 21st Century*. Cambridge, UK; Malden MA.: Polity Press 2016 [chapter 3 and 5]

Thomas Gieryn, "John Tyndall's Double Boundary-Work: Science, Religion, and Mechanics in Victorian England", pp.37-64 in Gieryn, T.F., *Cultural Boundaries of Science: Credibility on the Line*, University of Chicago Press, (Chicago), 1999.

Lecture 5 – Monday 28 October

Phew. Let's take a break and look at the story so far!

In this session we will wrap-up the issue of demarcation and discuss what we have learned thus far. We will also discuss your next assessment, and troubleshoot on essay writing skills.

Essential readings

Please read carefully the instructions on Assessment 2 on Moodle.

Choose one of the further readings from the previous weeks relevant to your essay (one which you have not yet read!) or locate, read and annotate a new article/book chapter beyond the ones listed in your bibliography.

Monday 4 November

READING WEEK – no classes

Part 2: Doing STS in the Real World

Now that you have acquired some basic concepts and methods in STS, we can start exploring how our discipline tackles research and problems in particular applied contexts. The second part of this course is case-based, and provides you with examples of how history, philosophy and social studies of science can serve as analytical tools as well as empirical methodologies to think critically about science in society, and to build a better science and a better future.

Lecture 6 – Monday 11 November

Ethics Matters!

In this session we explore the ethical challenges arising from scientific research. Some challenges will focus on the results of research and the ways in which it is disseminated. Others will concern the process of research itself, and science and society's effort at self-regulation. We will focus on specific case studies,

which will be discussed in detail and connected to various conceptual approaches to ethics.

Essential Readings

Listen to the *Guardian* podcast “How much does Google know about you?”, available at <https://www.theguardian.com/technology/audio/2019/aug/06/how-much-does-google-know-about-you-podcast>

Bobbie Johnson and Gideon Lichfield, “Hey Google Sorry you lost your ethics council, so we made one for you”, *MIT Technology Review*, 6 April 2019, available at <https://www.technologyreview.com/s/613281/google-cancels-ateac-ai-ethics-council-what-next/>

Jane Wakefield, “Google’s ethics board shut down”, BBC News, 5 April 2019. Available at <https://www.bbc.co.uk/news/technology-47825833>

Julia Bossmann, “Top 9 Ethical Issues in Artificial Intelligence”, *World Economic Forum*, 21 October 2016, available at: <https://www.weforum.org/agenda/2016/10/top-10-ethical-issues-in-artificial-intelligence/>

In preparation for the tutorials, answer the following questions:

Do scientists have to think about ethics?

Should we leave science alone?

What are the main ethical challenges in AI?

Is there anything special about AI and science that deserves particular kinds of ethical consideration?

Further Readings

Virginia Dignum, “Ethics in Artificial Intelligence: Introduction to the Special Issue”, *Ethics and Information Technology*, vol. 20 no. 1, pp. 1-3

Tännsjö, T. (2013) *Understanding Ethics*. Edinburgh: Edinburgh University Press.

Lecture 7 – Monday 18 November

Toward a More Diverse Science?

The authority of science has often come at the price of exclusion or subjugation of a number of social groups. Drawing on historical as well as philosophical sources, in this section we explore what science would look like, if it was carried out from the perspective of these underrepresented groups, and if their voices and contributions were taken seriously.

Essential Reading

Londa Schiebinger (2009), “West Indian Abortifacients and the Making of Ignorance”, in Robert Proctor and Londa Schiebinger (eds), *Agnology: The Making and Unmaking of Ignorance*, Stanford: Stanford University Press, pp. 149-162.

In preparation for the tutorial, answer the following questions:

Who was Maria Sybilla Merian?

In what context did she carry out research?

What is agnotology?

Whose 'ignorance' is discussed the text?

Why does Schiebinger state that the peacock flower was a 'highly political plant'? How can a plant be 'political'?

Further Readings

For the full story of the Peacock Flower see chapter 3 of Londa Schiebinger, *Plants and Empire: Colonial Bioprospecting in the Atlantic World*, Cambridge: Mass, Harvard University Press.

Lecture 8 – Monday 25 November

Picturing Science

Scientific knowledge takes many forms, which often comprise a range of visual tools and devices. This lecture explores the role images and other forms of visualisation play in scientists' arguments, how images and visualisation can serve as evidence for scientific claims, and how they participate more broadly in the legitimisation of scientific knowledge.

Essential Reading

Lynch, Michael (2015), "Visualisation in Science and Technology", in *International Encyclopaedia of the Social and Behavioral Sciences* (2nd ed.), ed. James D Wright, Amsterdam: Elsevier.

In preparation for the tutorial:

Choose a scientific image *or* an artistic image connected with science. Be prepared to explain:

Who is the maker of the image?

How and when was it made?

Where is it located, and how did it get there?

What is the image for?

Who was/is it for?

What idea or conception of science does it convey or reinforce?

Can you locate other images that relate to it, thematically or conceptually?

In what way can an image serve as an *argument*, on the basis of the questions above?

Further readings

Note: There are a lot of sources on visual culture, and a simple search will allow you to locate a really large literature! A few good texts are:

Annamaria Carusi, Aud Sissel Hoel, Timothy Webmoor and Steve Woolgar, *Visualisation in the Age of Computerisation*. London: Routledge, 2015.

Cateljine Coopmans, Janet Vertesi, Michael Lynch and Steve Woolgar, *Representation in Scientific Practice Revisited*. Cambridge, Mass.: The MIT Press, 2014.

[This is the updated edition of Michael Lynch and Steve Woolgar, *Representation in Scientific Practice*, Cambridge, Mass.: The MIT Press, 1990.

Boris Castel and Sergio Sismondo, *The Art of Science*. Toronto: The University of Toronto Press, 2008.

Lecture 9 – 2 December

Policy, Experts and Social Change

Scientific knowledge plays an important role in our society, informing all aspects of life, including policy decisions. While we want our policies to be based on scientific evidence, it is not clear what should be the role of scientist in the process. In this session, we are going to look at some case studies (both historical and contemporary) and examine the role of scientists in the political process.

Essential Readings

“Cases of vCJD still to emerge after mad cow disease scandal” BBC News (11 July 2019).

Url: <https://www.bbc.co.uk/news/uk-scotland-48947232>

Millstone, E and van Zwanenberg, P (2003) ‘BSE: A Paradigm of Policy Failure’ in *The Political Quarterly* Vol.74 no. 1, pp 27-37

In preparation for the tutorial answer the following questions:

What is mad cow disease, why was it a scandal?

Can we trust scientists?

What is/should be the role of scientists in the policy process?

Can science and technology lead to social change?

In addition, start looking at the following examples of blogs, and compare and contrast their styles (more examples of blogs are provided in the instructions for Assessment 3):

Nature Blog: <http://blogs.nature.com/>

Our own departmental blog, the STS Observatory: <https://blogs.ucl.ac.uk/sts-observatory/>

Alice Bell (a former STS graduate who has gone on to a glorious career, first in academia and then in a climate change NGO): <https://alicerosebell.wordpress.com/about/>

Brigitte Nerlich’s blog (this link is to an entry on Mary Sommerville):

<http://blogs.nottingham.ac.uk/makingsciencepublic/2016/12/30/science-communication-mary-somerville/>

Thony Christie’s blog (history of science): <https://thonyc.wordpress.com/>

Lecture 10 – 9 December

STS and The Meaning of Life

We got to the end of the road. But this is really only the beginning! In this lecture we will discuss what we have learned throughout this module, and where it will take you next.

And of course, who has time for the meaning of life when there is another coursework deadline looming? So yes – we will discuss the blog assignment, and what it means (practically, conceptually and ethically) to write for a non-academic audience. We will also discuss peer feedback, and how to be a honest and constructive peer reviewer.

Essential Readings

Read the blog assignment guidelines and come to the lecture and tutorial prepared with relevant questions. If you can, start reading at least two drafts of blogs written by your peers, and come to the tutorials with your group's feedback for them.

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.