HPSC0105 Sociology of Science and Technology

Course Syllabus

2023-24 session | Tiago Mata | t.mata@ucl.ac.uk

Course description

This module examines the sociological analysis of science and technology. We explore the complex relationship between science, technology, and society. This will include key sociological accounts of the processes by which knowledge is constructed and validated. The module introduces main currents of thought and important empirical studies that have been influential in the sociology of science. The focus is equally on contemporary and historical cases.

Basic course information

Moodle Web site:	https://moodle.ucl.ac.uk/course/view.php?id=37560
Assessment:	Essay (1000 words, level 6/iBSc students 1,500 words) 30%; Exam (3 hours) 70%
Timetable:	Tuesdays, 2-4 pm, UCL GOSICH - Wolfson Centre Room H (1st Floor)
Prerequisites:	No pre-requisites
Required texts:	Readings listed below
Course tutor(s):	Tiago Mata
Contact:	t.mata@ucl.ac.uk
Web:	http://www.ucl.ac.uk/sts/staff/mata
Office location:	22 Gordon Square, room 2.1.
Office hours:	11:00-12:00 Tuesday (office) 11.00-12.00 Thursday (online/Teams)

Schedule

Week	Topic	Date	Activity
1	**Introduction and social theory, from Marx to Mannheim**	3 October	Discuss weekly reading.
2	**Classic sociology of science**	10 October	Discuss weekly reading. Class debate.
3	**Symmetry and the sociology of knowledge**	17 October	Discuss weekly reading.
4	**Laboratory studies**	24 October	Discuss weekly reading. Deadline for choice of essay topic.
5	**Social construction of technology**	31 October	Discuss weekly reading. Show and tell.
6	**Reading Week**	7 November	No class
7	**Actor Network Theory and facts**	14 November	Discuss weekly reading. Submission of reading list for essay.
8	**Feminist epistemologies**	21 November	Discuss weekly reading. Poll and class debate.
9	**Public reason**	28 November	Discuss weekly reading. Role play.
10	**Social movements**	5 December	Discuss weekly reading. Media analysis.
11	**Sociology in action**	12 December	Discuss weekly reading.

Aim

To develop an understanding of how the social studies of science can help inform more inclusive and just forms of scientific life and practice.

Objectives

By the end of this module students should

(1) have an understanding of how science works as a social process i.e. how technical knowledge is produced by communities,
(2) have a detailed knowledge of the main theories in the sociology of science,
(3) be aware of the strengths and weaknesses of a range of sociological approaches to the analysis of science and technology, and
(4) be able to link sociological analyses of science with broader debates in science policy, history of science, and philosophy of science.

Assessments

In order to be deemed 'complete' on this module students must attempt all parts of the assessment: essay and exam.

Coursework 1 (30%)	Assessment 1: Essay	1000 words	13 December 5pm
Coursework 2 (70%)	Assessment 2: Exam	3 hours	tbd

For students taking the module at Level 6/iBSc students:

Coursework 1 (30%)	Assessment 1: Essay	1500 words	13 December 5pm
Coursework 2 (70%)	Assessment 2: Exam	3 hours	tbd

Format of classes

The classes for this module will be a hybrid of lectures and seminars. In the lecture parts the essential readings of the week will be set against a broader analytical context and connections will be made across the weeks' themes. In the seminar portions of our meetings we will do activities that rely on the week's reading. It is therefore key that students come prepared with notes on the essential readings to fully grasp the lecture component of the classes and to participate in the activities.

The classes blend passive and active learning situations. We will also reserve time each week to answer questions about the module's "additional" readings and the larger issues in the sociology of science and technology.

Course expectations

Students are expected to attend and participate in all classes. They are expected to come prepared by having read the "essential readings." These readings are the foundation for the work we will do in class.

Students should expect to talk and participate in discussions at every session, if they do not volunteer they may be called on to participate. Hearing and reading is generally not enough to grasp new knowledge, using that knowledge in discussion with peers or applying it in new settings is key for comprehension.

To create a productive work environment, students and lecturer must strive to make the classroom a safe and supportive space, where one can speak freely of own's puzzlements and incomprehension. Only together, helping each other, can we hope to understand the key theories and concepts that make up this module. When giving and receiving feedback, students should do so in the spirit of helping one another. All students should be mindful of UCL's Code of Conduct for Students and Guidance on Good Online Behaviour.

Students are encouraged to raise their queries about the module's contents in class. It is very likely that others will have the same questions and we all benefit from addressing them together. However, if ever time runs out, we move onto other topics, or the explanations in class are insufficient, students are strongly encouraged to approach the lecturer at his office hours.

Reading list

An electronic reading list containing links to all the references, as well as a guide to the readings is available on Moodle.

Below is a list of **essential** and **additional** readings for this module.

In class we will discuss the **essential** readings. They were deemed essential for a reason: the classes cannot function without them. These readings are original contributions to the field of the sociology of science and technology, even when abridged they will be challenging to read. Some of these texts are dense and subtle and making notes and re-reading parts will be necessary. This patience and care will pay off!

Essential readings are likely not to be sufficient to have a good mark in the module. You should also be mindful of the lectures that partner with the readings. For exam preparation in addition to the essential readings and lectures, students should read some of the

additional texts referenced for each week as they will deepen their knowledge of the week's subject. These readings will likely also be useful for the essay part of the assessment.

At times, it may be useful to seek not depth but scope, being able to set the contributions of the essential readings against the landscape of the discipline of sociology. With this goal in mind, two introductory texts in science studies are recommended for a more synoptic account of the week's themes. The books are Steven Yearley's 2005, *Making Sense of Science* and Sergio Sismondo's 2010, *An Introduction to Science and Technology Studies.* Both books are available as e-books through the library. The correspondence between weekly topics and chapters of the books will be provided on moodle.

Week 1: Introduction and social theory, from Marx to Mannheim

In our first session we take a tour of the module and review learning objectives and the assessments. We also make a start with a discussion of some early contributions to a theory of science and knowledge originating in some of the founding figures of social theory. The aim of these scholars was to make social inquiry into a science, and this meant that they first needed to theorise science as a human activity.

Essential Reading

Mannheim, Karl (1936) *Ideology and Utopia*. New York: Harcourt, Brace & World, chapter 2.

Additional Reading

Durkheim, Emile (1915) *The Elementary Forms of the Religious Life*. London and New York: G. Allen & Unwin, pp. 462-496 (Conclusion).

Mannheim, Karl. (1952 [1925]) "The Problem of the Sociology of Knowledge from the Dynamic Standpoint." in *Essays in the Sociology of Knowledge by Karl Mannheim*, pp. 179-190.

Week 2: Classic sociology of science

The sociology of science began to establish itself as an independent discipline after World War II. The central problem of the burgeoning sub-discipline was to explain the institutional origins of science. These scholars stressed how the values held by scientists were in dissonance with the common values of liberal capitalism, and they offered socio-historical explanations for science's exceptionalism.

Essential reading

Merton, R. K. (1973) "The Normative Structure of Science," in *The Sociology of Science: Theoretical and Empirical Investigations.* Chicago: University of Chicago Press, pp. 267-278.

Additional reading

Ben-David, Joseph and Teresa A. Sullivan (1975) "Sociology of Science" *Annual Review of Sociology* 1(1): 203-222.

Bourdieu, Pierre (1975) "The Specificity of the Scientific Field and the Social Conditions of the Progress of Reason." *Social Science Information* 14 (6): 19-47.

Mulkay, M. J. (1976) "Norms and Ideology in Science," *Social Science Information* 15:637-656.

Zilsel, Edgar (1941-2) "The Sociological Roots of Science" *American Journal of Sociology* 47: 544-62.

Week 3: Symmetry and the sociology of knowledge

However insightful, the early sociology of knowledge and sociology of science in trying to model scientific life and practice placed science on a pedestal. Science studies emerged as a rejection of these aspirations. The so called "strong program" in the sociology of knowledge set out to develop a theory of scientific belief, i.e. an account of why scientists came to believe in what they believe. Although the theory it put forward, focused on interests, has come into disuse, the "strong program" introduced a key methodological innovation that has stayed with us: the principle of symmetry. In this class we will unpack what this means and what it offers us analytically.

Essential reading

Bloor, D (1991 [1976]) *Knowledge and Social Imagery*. Routledge, chapter 1 'The Strong Programme in the Sociology of Knowledge'.

Additional reading

Bloor, D (1991 [1976]) *Knowledge and Social Imagery*. Routledge, afterword in 2nd Edition for response to critics.

Gillespie, B., Eva, D., & Johnston, R. (1979) "Carcinogenic Risk Assessment in the United States and Great Britain: The Case of Aldrin/Dieldrin" *Social Studies of Science*, 9(3): 265–301.

Shapin, S. (1979) "The Politics of Observation: Cerebral Anatomy and Social Interests in the Edinburgh Phrenology Disputes" *The Sociological Review*, 27(1_suppl): 139–178.

Week 4: Laboratory studies

The "strong program" was drawn to controversies, often looking to the history of science and picking out pivotal junctures in the development of academic disciplines. Alongside these studies another stream of analysis was developing. Sociologists and anthropologists began to study scientists at work, not in the course of legendary intellectual disputes that defined an epoch, but busy in the dull routines of knowledge making. "Laboratory studies" was the phrase adopted to describe those studies that looked closely at the relationships between scientists, material culture, social relations, organisational systems and epistemology. What those scholars found was that scientific practice was packed with ambiguities and uncertainties and that social factors, not nature, were crucial to stabilise beliefs.

Essential reading

Knorr Cetina, Karin. (1992) "The Couch, the Cathedral, and the Laboratory: On the Relationship between Experiment and Laboratory in Science" in Andrew Pickering (ed.) *Science as Practice and Culture*. Chicago University Press, Chicago, pp. 113-138.

Additional reading

Collins, H. M. (1975) "The Seven Sexes: A Study in the Sociology of a Phenomenon, or the Replication of Experiments in Physics." *Sociology* 9 (2): 205–24.

Collins, H. M. (1983). The Sociology of Scientific Knowledge: Studies of Contemporary Science. *Annual Review of Sociology*, *9*: 265–285.

Latour, B. and Woolgar, S. (1986) *Laboratory Life: The Construction of Scientific Facts*, chapter 1 "From Order to Disorder," pp. 15-42.

Knorr Cetina, K. (1995) "Laboratory Studies: The Cultural Approach to the Study of Science" Chapter 7 in: *Handbook of Science and Technology Studies,* edited by Sheila Jasanoff, Gerald E. Markle, James C. Peterson and Trevor Pinch. Sage.

Week 5: Social construction of technology

Just as science, technology was often deemed an unsuitable subject for sociology. Technology was wrapped in clouds of genius, entrepreneurship, and serendipity in often unpredictable combinations. Sociologists began to venture into this once forbidden territory to show that the designs of technology often bore the imprint of economic power and cultural privilege. Technology addressed problems that were set by a small few and it was regulated in differing ways across nations and time. As this work developed distinctions between studies of science and of technology began to fade away. This convergence was helped by the growing intersecting of esoteric and technical academic disciplines that created what we call "techno-science."

Essential reading

Mackenzie, D & Wajcman J (1999) *The Social Shaping of Technology*. Open University Press, chapter 1.

Additional reading

Pinch, Trevor J.; Wiebe E. Bijker (1984) "The Social Construction of Facts and Artefacts: or How the Sociology of Science and the Sociology of Technology might Benefit Each Other" *Social Studies of Science* 14(3): 399-441.

Winner, Langdon (1980) "Do Artifacts Have Politics?" *Daedalus* 109 (1): 121–36.

Winner, Langdon (1993) "Upon Opening the Black Box and Finding It Empty: Social Constructivism and the Philosophy of Technology" *Science, Technology, & Human Values* 18(3): 362-378.

Week 7: Actor Network Theory and facts

Actor Network Theory (ANT) is arguably the most widely recognised theory coming out of science studies, and it has deeply influenced work done in the humanities and in social sciences like anthropology. ANT has its roots in "laboratory studies" but has come to have a career beyond sites of experimentation. Laboratory studies had paid attention to the role of the built environment and of instrumentation in the pursuit of scientific inquiry, Bruno Latour and his collaborators took this insight a step further arguing that microbes, devices, software, the paraphernalia of science, were endowed of agency. According to ANT facts are not to be found but rather established through alliances between humans (scientists) and non-human actors. Always polemical for its radical relativism, the approach has proven itself illuminating in numerous ways, recently helping us to think through the impasse of the climate crisis.

Essential reading

Callon, Michel (1986) "Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St Brieuc Bay." in *Power, Action, and Belief*, edited by J. Law. London: Routledge & Kegan Paul, pp. 196-233.

Additional reading

Amsterdamska, O (1990), 'Surely you are joking, Monsieur Latour!' *Science, Technology and Human Values* 15: 495-504.

Latour, Bruno (1983) "Give Me a Laboratory and I Will Raise the World." Pp. 141-170 in Science Observed: Perspectives on the Social Study of Science, edited by K. D. Knorr-Cetina and M. Mulkay. London: Sage.

Latour, Bruno (2018) *Down to Earth*. Polity, chapters 17 and 18.

Week 8: Feminist epistemologies

As with ANT, one of the most influential contributions of the sociology of science and technology is Feminism. Third wave feminism was a political movement but also an academic trend that reshaped the course of many disciplines in the humanities and social sciences. That engagement has been specially productive within the sociology of science, technology and medicine. Feminist scholars have documented and unpacked the prevalence of patriarchal themes in scientific inquiry, in the ways that nature is gendered along the lines of a male/female binary. They have examined how normative discourses on bodies and sexuality come to format our knowledge about ourselves and nature. Feminist scholars have not only dissented from scientific orthodoxy, they have put forward proposals for an epistemology that addresses age old inequities.

Essential reading

Haraway, Donna (1988), "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective" *Feminist Studies* 14 (3): 575-599.

Additional reading
Haraway, Donna (1989) *Primate Visions*. New York: Routledge, chapter 3 "Teddy Bear Patriarchy," pp. 26-58.

Martin, Emily (1991) "The Egg and the Sperm: How Science Has Constructed a Romance Based on Stereotypical Male-Female Roles." *Signs* 16 (3): 485–501.

Subramaniam, Banu, Laura Foster, Sandra Harding, Deboleena Roy, and Kim TallBear (2017) "Feminism, Postcolonialism, Technoscience" in *The Handbook of Science and Technology Studies*. Fourth Edition, edited by Ulrike Felt, Rayvon Fouché, Clark A. Miller and Laurel Smith-Doerr. Cambridge, MA: MIT Press: 407-433.

Week 9: Public reason

Science's role in contemporary lives goes beyond the writing down of the laws of nature. Scientists acting as experts, become advisers in public and private bureaucracies and authoritative witnesses to courts and parliamentary committees. Further, science offers itself as a model for reasoned judgment. Despite its enviable cultural authority, science in entering the sphere of public policy must submit to institutional forms that are space or time specific. Polities, with their particular political and legal traditions, matter for what counts to be true in public and in policy. This week we examine comparative studies of national regimes of knowledge making to better understand the roles of science in public policy.

Essential reading
Jasanoff, Sheila (2004)(ed.) States of Knowledge: The Co-Production of Science and Social Order. *London: Routledge*, "Ordering Knowledge, Ordering Society", pp. 13-45.

Additional reading
Carson, J. (2004) "The Science of Merit and the Merit of Science: Mental Order and Social Order in Early 20th Century France and America," in Jasanoff, *States of Knowledge*, pp. 181-205.

Lee, M. et al. (2018) 'Techniques of Knowing in Administration: Co-production, Models, and Conservation Law' *Journal of Law and Society*, 45(3): 427–456.

Sunder Rajan, K. "Two Tales of Genomics: Capital, Epistemology, and Global Constitutions of the Biomedical Subject," in S. Jasanoff, ed., *Reframing Rights*, pp. 193-216.

Week 10: Social movements

Sociologists do not just probe the workings of eminent policy committees with their stellar cast of advisers, they also pay close attention to the work of grassroots movements seeking to challenge those spaces of authority. Sociologists of science and medicine have contributed extensively to our understanding of how social movements successfully challenge accredited knowledge. Bio-medical knowledge because of its influence in governing people's lives and identities has been a flashpoint for numerous controversies where the lines of expert and non-expert are fought over and redrawn.

Essential Reading

Epstein, S. (1995) 'The Construction of Lay Expertise: AIDS Activism and the Forging of Credibility in the Reform of Clinical Trials', *Science, Technology, & Human Values*, 20(4): 408–437.

Additional Reading

Wynne, Brian. 1992. "Misunderstood Misunderstandings: Social Identities and Public Uptake of Science." *Public Understanding of Science* 1: 281-304.

Frickel, Scott, and Kelly Moore. 2006. "Prospects and Challenges for a New Political Sociology of Science" in *The New Political Sociology of Science: Institutions, Networks, and Power*, edited by S. Frickel and K. Moore. Madison: University of Wisconsin Press, pp. 3-14.

Gieryn, Thomas (1983) "Boundary Work and the Demarcation of Science from Non-Science: Strains and Interests in the Professional Ideologies of Scientists" *American Sociological Review* 48: 781-795.

Breyman, Steve and Nancy Campbell, Virginia Eubanks, and Abby Kinchy (2016) "STS and Social Movements: Pasts and Futures" in *The Handbook of Science and Technology Studies*, Fourth Edition, edited by Ulrike Felt, et al., MIT Press, pp. 289-317.

Week 10: Sociology in action

A contemporary trend in sociology of science is to work closely, on the ground, on specific social problems. These scholar-activists draw freely from the various theories we have reviewed in this module, and assemble those ideas to touch upon specific societal challenges. These scholars go beyond recording the co-production of science and society, they are inserting themselves into that process to steer it to more just and equitable outcomes. In this session we review a few projects to see how they deploy science studies to change the world.

Essential Reading

Lövbrand, Eva, Silke Beck, Jason Chilvers, Tim Forsyth, Johan Hedrén, Mike Hulme, Rolf Lidskog, and Eleftheria Vasileiadou. 2015. "Who Speaks for the Future of Earth? How Critical Social Science Can Extend the Conversation on the Anthropocene." *Global Environmental Change* 32:211-18.

Additional Reading
Benjamin, Ruha. (2019) *Race After Technology: Abolitionist Tools for the New Jim Code*. Polity, chapter 5.

Allen, Barbara L. (2018) "Strongly Participatory Science and Knowledge Justice in an Environmentally Contested Region." *Science, Technology, & Human Values* 43 (6): 947–71.

TallBear, Kim (2013) "Genomic articulations of indigeneity" *Social Studies of Science*, 43(4), 509–533.

Assessments

ASSESSMENT ONE: Essay (1000 or 1500 words) 30%
You will write an *essay that discusses the main contributions of a notable scholar in the sociology of science and technology*.

The list of potential authors includes: Brian Balmer, Ruha Benjamin, Pierre Bourdieu, Ulrich Beck, Steve Fuller, Donna Haraway, Evelyn Fox Keller, Alondra Nelson, Helga Novotny, Kim TallBear, Edward Shils, Brian Wynne. Students may suggest other scholars, but the choice must be approved by the lecturer.

The essay will be a reading report of some of the main contributions by your chosen author. Students should
1. summarise the key ideas of the chosen texts;
2. frame those ideas/contributions against the language of the module (theories, concepts),
3. note how what these contributions complement, contradict, expand what they have learned in the module.
The essay should therefore be in equal parts: **description, categorisation, and personal reflection.**

Several students will be writing about the same author but each author will have made several contributions to the field, so students should write about different sets of contributions. We will coordinate this in class.

Written assessments must be submitted via Turnitin. They should be in 12 point type, minimum 1.5 line-spaced, with a title, page numbers added and with a word count at the end. The word count does not include bibliography and the AI statement (see below).

Criteria for assessment
The departmental marking guidelines for individual items of assessment can be found in the STS Student Handbook. In addition to the criteria indicated in the STS Student Handbook, the following are the main criteria on which your essay will be marked.

1. Address the assignment

Read the assignment request carefully and make sure to meet its learning and assessment objectives.

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 presented in a logical order? Using signposting sentences (in this section I will argue that…) will help.

3. 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. Good use of English, accurate spelling, grammar, punctuation and simple, active sentence structure also improve clarity.

4. Argumentation/analysis
There is no right answer to this assignment question in that any of the mentioned authors may fit the landscape in numerous ways. (There are some wrong answers.) Even so you must provide *one answer, that is most plausible to you, and make the case.* Is the main argument of the essay clear, coherent and persuasive? Is it properly supported by the evidence available?

5. 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?

6. 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. Making use of ideas from or paraphrasing material without clearly referencing the original source is plagiarism and has incurs serious penalties. If you are unsure how to reference, please follow the advice from UCL Library

- UCL explanation of Academic Integrity for students: https://www.ucl.ac.uk/students/exams-and-assessments/academic-integrity
- UCL Library guide to referencing and avoiding plagiarism: https://library-guides.ucl.ac.uk/referencing-plagiarism
- Tutorial on referencing and avoiding plagiarism (making use of some nice clip art) https://www.ucl.ac.uk/library/forms/articulate/referencing-plagiarism/story_html5.html
- UCL Academic Integrity Moodle Course: https://www.ucl.ac.uk/teaching-learning/news/2019/nov/introduction-academic-integrity-new-moodle-course-taught-students-goes-live
- Details of the penalties for academic misconduct: https://www.ucl.ac.uk/academic-manual/chapters/chapter-6-student-casework-framework/section-9-student-academic-misconduct-procedure#9.3

7. Bibliography and AI statement
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.

The essay must include a statement declaring to what extent generative AI was used in the research and writing. The statement can be a single sentence: "I have not used AI tools for research or writing this essay" or it can be detailed, naming the tools, the uses made of the tools and your reflection and evaluation of their usefulness.

ASSESSMENT TWO: Exam (3 hours) 70%
Students will be assessed by a 3 hour exam. The format of that exam will be of a set of questions from which students can pick a subset to attempt an answer.

Examples of exams of a few years prior will be provided on moodle and guidance on how to prepare will be offered to students.

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.