

# HPSC0121

## Sociology of Science & Technology

### Course Syllabus

2023-24 session | Prof. Brian Balmer | Email [b.balmer@ucl.ac.uk](mailto:b.balmer@ucl.ac.uk)

#### Course Information

This course introduces students to a set of concepts that will allow them to understand science and technology as social institutions and systems of knowledge production. It takes a sociological look at the process by which knowledge is collectively produced by communities, and how this knowledge in turn remakes the world, through historical and contemporary studies. It also provides an introduction to the main scholars and traditions in the sociology of science and technology.

#### Basic course information

Course website:	See Moodle
Moodle Web site:	See Moodle, search HPSC0121
Assessment:	2 essays: 1000 word essay (20%), 3000 word essay (80%)
Timetable:	See UCL online timetable
Prerequisites:	Course aimed at postgraduate students
Required texts:	See below
Course tutor(s):	Prof. Brian Balmer
Contact:	<a href="mailto:b.balmer@ucl.ac.uk">b.balmer@ucl.ac.uk</a>
Web:	<a href="http://www.ucl.ac.uk/sts">www.ucl.ac.uk/sts</a> - see current staff
Office location:	22 Gordon Square, room 2.3
Office hours:	

#### Schedule

UCL	Topic	Date	Activity
20	Science as a Social Institution and Functionalism Sociology of Science	See Moodle	See Moodle
21	The Strong Programme and the Sociology of Scientific Knowledge	See Moodle	See Moodle
22	Laboratory Studies, Ethnography and The Micro-social Approach	See Moodle	See Moodle

23	Actor-Network Theory	See Moodle	See Moodle
24	Science and Identity: Gender, Postcolonialism, Disability	See Moodle	See Moodle
25	Reading Week		See Moodle
26	Technology 1: The Social Construction of Technology	See Moodle	See Moodle
27	Technology 2: How STS Studies Military and Security Technologies	See Moodle	See Moodle
28	Counting and Objectivity	See Moodle	See Moodle
29	The Politics of Science: Expertise, Boundary Work, Co-Production.	See Moodle	See Moodle
30	Non-Knowledge: Secrecy, Ignorance and Uncertainty	See Moodle	See Moodle

## Assessments

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### Summary

	Description	Deadline	Deadline for Tutors to provide Feedback
<b>Assignment 1</b>	1000 word presentation based essay	21 Feb 2024 17.00 hrs	<a href="https://www.ucl.ac.uk/srs/academic-manual/c4/feedback">https://www.ucl.ac.uk/srs/academic-manual/c4/feedback</a>
<b>Assignment 2</b>	3000 word in-depth essay	25 March 2024 17.00 hrs	<a href="https://www.ucl.ac.uk/srs/academic-manual/c4/feedback">https://www.ucl.ac.uk/srs/academic-manual/c4/feedback</a>

**See end of this syllabus for assignment instructions.** Essays must be submitted via Moodle. In order to be deemed 'complete' on this module students must attempt all parts of the assignments.

### Specific Criteria for Assessment for this Module:

The departmental marking guidelines for individual items of assessment can be found in the STS Student Handbook (see module Moodle page for a link).

## Module Aims & Objectives

The aim of this course is to undertake a detailed examination of the sociological contribution to the analysis of science and technology. It examines the complex relationship between science and society and also takes a sociological look at the process by which knowledge is constructed. The course introduces students to the main currents of thought which have been influential in sociology of science and technology through both historical and contemporary studies.

By the end of this module you should:

- Have an understanding of how science and technology work as social processes e.g. the way technical knowledge is produced by communities, and the way this knowledge in turn can reshape social structures and processes
- Have a detailed knowledge of the main concepts and theories in the sociology of science and technology.
- Be aware of the strengths and weaknesses of a range of sociological approaches to the analysis of science and technology.
- Begin to see links between sociological analyses of science and technology and broader debates in science policy, history of science and philosophy of science.

Although this course will draw on more general arguments and ideas in sociology, you will not be expected to become an expert in all these wider debates. I can provide further reading for anyone who wishes to place each topic in a broader sociological context.

## Course expectations

Each week the class will be divided into a 2 hour seminar and discussion session. *You will be expected to have watched the pre-recorded lectures, read the week's essential readings and done any seminar preparatory work (see Moodle) for the seminars and to contribute fully to seminar discussions.* The preparatory work should take 2-3 hours each week.

If your prior study has not involved seminar discussions as a means of teaching, you will find the following resource useful to read:

Cottrell, S (2019) *The Study Skills Handbook* (London: MacMillan) Chapter 8 especially pp171-3 and 177-9. Available as E-book through UCL Library.

You must attempt both essay assignments in order to complete this course.

**Accessibility:** I am working towards making the module as accessible as reasonably possible. I can provide Powerpoint slides with alternative titles for images and can provide files such as .pdfs in other formats. Please contact me if you have any accessibility request.

## Reading list

There are several introductory textbooks on the sociology of science, and you are strongly recommended to purchase **one**:

- Yearley, Steve (2005), *Making Sense of Science: Understanding the Social Study of Science* (London: Sage) [A good overview, with a leaning towards more contemporary issues] Abbreviated to **SY** on this reading list;
- Sismondo, Sergio (2010), *An Introduction to Science and Technology Studies* (Oxford: Blackwell) 2<sup>nd</sup> Edition [Another good introduction, with a greater leaning towards philosophy of science than the other texts]. Abbreviated to **SS** on this reading list.
- Bucchi, Massimiano (2002), *Science in Society: An Introduction to Social Studies of Science* (London: Routledge) [Well written, a little too concise in places but particularly good if you are interested in public understanding/ communication of science] Abbreviated to **MB** on this reading list;
- David, Matthew (2005), *Science in Society* (Basingstoke: Palgrave). Tends to be aimed more at sociology students, but still a good introduction particularly if you're interested in wider links with social theory. Abbreviated to **MD** on this reading list.

You should also be aware of the *Handbook of Science and Technology Studies*, which has overviews of particular topics in STS:

Felt, U et al (eds.), 2016, *The Handbook of Science and Technology Studies* (Fourth Edition), (Cambridge Mass: MIT Press). See table of contents at <https://mitpress.mit.edu/books/handbook-science-and-technology-studies-0>

Hackett, EJ et al (eds.), 2007, *The Handbook of science and technology studies* (3rd Edition), (Cambridge, Mass.; London: MIT Press). Also the 1995 2<sup>nd</sup> edition still has good, relevant overviews of topics)

## Lecture Readings:

### Week 1. Functionalist Sociology of Science and its Critics

Scientists and philosophers frequently offer explanations for how scientific knowledge is supposed to progress. Sociologists of science instead ask what science is really like and how it is really done. Does it live up to the ideal image that we are often presented with? Are there alternative ways of knowing and if so, what are the implications? This session introduces classical functionalist accounts of science as a social institution and key criticisms of these accounts.

#### Essential reading

Sismondo, S (2010), *An Introduction to Science and Technology Studies* (Oxford: Blackwell) Chapter 3 (Questioning Functionalism in the Sociology of Science) (E-book UCL Library)

### Recommended reading

1. Merton, RK (1973), 'The Normative Structure of Science', in *The Sociology of Science* (Chicago: University of Chicago Press), Chapter 13 pp267-278  
<https://www.panarchy.org/merton/science.html>
2. Mulkay, M (1976), 'Norms and Ideology in Science' *Social Science Information*, 15(4/5)pages 637-656

### Bringing the debate up to date:

Lee, Y.-N. and Walsh, J. P. (2021) 'Rethinking Science as a Vocation: One Hundred Years of Bureaucratization of Academic Science', *Science, Technology, & Human Values* [online journal article available through UCL library e-journals]

### Additional Readings:

Mitroff, I (1974), 'Norms and counter-norms in a select group of Apollo moon scientists', *American Sociological Review* Vol.39 pp579-95. (Pay attention to the main points of the introduction and conclusion)

Erickson, M (2016 2<sup>nd</sup> Edition), *Science, Culture and Society: Understanding Science in the 21st Century* (Cambridge: Polity) (Chapter 5: Scientists and Scientific Communities) (UCL Library E-book)

Grundmann, R. (2013). "Climategate" and the scientific ethos. *Science, Technology, & Human Values*, 38(1), 67-93.

Shapin, S (2008), *The Scientific life: a moral history of a late modern vocation*, University of Chicago Press (Chapter 1 – Knowledge and Virtue)

Visvanathan, S. (2006). Alternative Science. *Theory, Culture & Society*, 23(2–3), 164–169.

Panofsky, A. L. (2010). A critical reconsideration of the ethos and autonomy of science. in Calhoun, C. (Ed.). (2010). *Robert K. Merton: sociology of science and sociology as science*. Columbia University Press. (UCL Library E-book)

## Week 2. The Strong Programme and the Sociology of Scientific Knowledge

This week we begin to consider how we investigate and think about science in ways that move us beyond the 'traditional' or 'common sense' understandings. We will look at The Strong Programme, which is considered to be one of the foundational influences on the sociology of science. In particular we will look at its principle of symmetry and how it helped us begin to understand the work that goes into making scientific knowledge, and how vital the 'social' is in

this process. We will also consider some of the critiques of the Strong Programme and how it may or may not be useful today.

### **Essential Reading:**

Bloor, D (1991 [1976]), *Knowledge and Social Imagery* (Routledge) esp. Chapter 1 'The Strong Programme in the Sociology of Knowledge', pp3-23 [Electronic version on course e-reading list on Moodle]

### *Bringing the Debate Up to Date*

Lynch, M (2020), 'We Have Never Been Anti-Science: Reflections on Science Wars and Post-Truth', *Engaging Science, Technology, and Society* 6: 49-57 [Available at <https://www.estsjournal.org/index.php/ests/article/view/309> then click 'pdf' ]

### **Text Book Overviews of the Strong Programme**

SY – Chapters 2-3 **(most recommended)** OR

MB – Chapters 2-3 OR

SS – Chapter 5 OR

MD – Chapter 4

### **Additional Reading**

Berger, P and Luckman, T (1966), *The social construction of reality : a treatise in the sociology of knowledge* (New York: Doubleday) (or <http://perflensburg.se/Berger%20social-construction-of-reality.pdf>) Intro and chapter 1 – sets out an agenda for the sociology of knowledge (not science *per se*)

### *Philosophers debate the Strong Programme:*

Chalmers, A (1990), *Science and its Fabrication* (chapters 6-8) (a critical overview of the strong programme)

Laudan, L (1981), 'The Pseudo-Science of Science', *Philosophy of the Social Sciences.*, Vol.11 (2) pp.173-98. (Scathing critique of the strong programme)

Bloor, D (1981), 'The Strengths of the Strong Programme', *Philosophy of the Social Sciences*, Vol.11(2) pp.199-213.  
(Scathing defence of the strong programme) [Response to Laudan's article above]

### *Sociologists largely ignore them and do Case Studies:*

Gillespie B *et al* (1979), 'Carcinogenic Risk Assessment in the United States and Great Britain: The Case of Aldrin/Dieldrin', *Social Studies of Science*, 1979, Vol.9(3), pp.265-301 [See also module E-reading list on Moodle]

Webster, A (1991), *Science, Technology and Society* (Basingstoke: MacMillan) (Chapter 2)

Collins, H and Pinch, T (1993), 'The Germs of Dissent: Louis Pasteur and the Origins of Life', in *The Golem: What Everyone Should Know About Science* (Chapter 4), 79-90 [e-copy in library]

### **Week 3. Laboratory Studies, Ethnography and The Micro-social Approach**

The 'strong programme' argued that broad social and political conditions could influence the content of scientific knowledge. Towards the end of the 1970s sociology of science took a distinctly micro-social (and linguistic) turn. Detailed studies of scientists, in laboratories or making claims in papers, became the preferred methodology of 'lab anthropologists'. The complex negotiations, contingencies and skills involved in creating 'a fact' (and the way that these were all erased from the final product) became the focus of attention.

#### **Essential Readings**

Latour, B. and Woolgar, S. (1986) *Laboratory Life: The Construction of Scientific Facts*. Chapter 1 'From order to disorder' (pp. 15-42) . Electronic copy available through UCL Library Catalogue

*Bringing the Debate Up to Date*

Calkins, S. (2021) 'Toxic remains: Infrastructural failure in a Ugandan molecular biology lab', *Social Studies of Science*, 51(5), pp. 707–728. doi: 10.1177/03063127211011531. [UCL library e-journals]

#### **Text Book Readings:**

Either

SY – Chapter 6 *OR*

MB – Chapter 4 *OR*

SS – Chapters 6, 9 *OR*

MD – Chapter 5

#### **Additional Reading:**

Some nice overviews:

Knorr-Cetina, K. D. (1981) 'Social and Scientific Method or What Do We Make of the Distinction Between the Natural and the Social Sciences?', *Philosophy of the Social Sciences*, 11(3), pp. 335–359.

Knorr-Cetina, K (1995), 'Laboratory Studies: The Cultural Approach to the Study of Science' in Jasanoff S *et al* (eds) *Handbook of Science and Technology Studies*, (London: Sage) (2<sup>nd</sup> ed), 140-166 (Not an easy read, but very succinct overview of the approach).

Doing, P (2008), 'Give me a Laboratory and I will Raise a Discipline: The Past, Present and Future Politics of Laboratory Studies in STS', in Hackett, EJ (et al) (2008), *The Handbook of Science and Technology studies* (Cambridge, Mass.; London: MIT Press) (3rd ed)

#### Examples of Ethnographies of Science:

Popova, Kristina. (2021) 'Reproducibility and Instruction Following in the Shop Floor Laboratory Work: The Case of a TMS Experiment', *Science, Technology, & Human Values* [Online article available through UCL e-journals].

Harry Collins and Trevor Pinch (1998) [1993] "A New Window on the Universe: The Non-Detection of Gravitational Radiation", in *The Golem: What You Should Know About Science*, Cambridge: Cambridge University Press: 91-108. [Electronic reading list for course on Moodle]

Karin Knorr-Cetina (1999) "From; Machines to Organisms: Detectors as Behavioural and Social Beings", in *Epistemic Cultures: How the Sciences Make Knowledge*, Cambridge, Mass.; London: Harvard University: 111-135. [Chapter available through course e-reading list on Moodle]

Mol, A (2002), 'Cutting Surgeons, Walking Patients: Some Complexities Involved in Comparing', in Law, J and Mol, A (eds) *Complexities: Social Studies of Knowledge Practices* (Durham: Duke University Press) [e-book available from UCL library]

### **Week 4. Actor-network theory (ANT)**

One of the most influential schools of thought since the 1980s and 1990s has been 'actor-network theory' (ANT). Its central idea is that 'facts' are created when 'heterogeneous' assemblages of actors and objects are mobilized into a 'network'. Science and society are *both* co-created as the laboratory is used as a focal point for assembling knowledge and redefining social interests. Science becomes 'politics by other means'.

#### **Essential Readings**

Latour, B (1983), 'Give Me a Laboratory and I will Raise the World', in *Science Observed: Perspectives on the Social Study of Science* (London: Sage), 141-170. or extract in Biaggio, M (1999), *The Science Studies Reader* (Ch.18). [Available in online reading list, Moodle]

AND

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

#### **Bringing the debate up to date**

Michael, M (2016) *Actor-Network Theory: Trials, Trails and Translations* (London: Sage) (Chapter 7 'On Some Post-ANTs) (E-book available from UCL library)

#### **Text Book Overviews**



Either

SY – Chapter 4 OR

SS – Chapter 7

Or Michael, M (2016) *Actor-Network Theory: Trials, Trails and Translations* (London: Sage) Ch.3

### **Additional Reading:**

If you read one piece of extra reading, read this:

Latour, B (1999), *Pandora's Hope: Essays on the Reality of Science Studies* (Chapter 2 'Circulating Reference') (Includes a good, relatively clear, illustrative case study of Amazonian soil science in the making – best to ignore the confusing diagrams) [Electronic reading list for course on Moodle]

### Further Reading:

Michael, M (2016) *Actor-Network Theory: Trials, Trails and Translations* (London: Sage) Ch.3 and 4 (and 7 if you are interested in bringing ANT up to date) (E-book available from UCL library)

Latour, B (1987), *Science in Action* (Harvard University Press) (especially introduction and chapters 1 & 2) (A classic overview of Latour's theories) (Chapter 2 'Laboratories' is on Moodle e-reading list)

Callon, M (1986), 'Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St Brieuc Bay', in Biaglio, M (1999), *The Science Studies Reader* (London Routledge) (Ch.5) (Some key ANT jargon explained through a case study of molluscs in Brittany) (Case study also discussed in SY text book)

Scott, P (1991), 'Levers and Counterweights: A Laboratory that Failed to Raise the World', *Social Studies of Science* Vol.21 pp7-37 (empirically based critique of Latour)

Collins, HM and Yearley, S (1992), 'Epistemological Chicken' in A. Pickering (ed) *Science as Practice and Culture* (Chicago: University of Chicago Press) pp301-26 (attacks the notion that non-humans can be treated as if they were the same as intentional actors)

*See also:*

Callon M and Latour B (1992), "Don't Throw the Baby Out with the Bath School! A Reply to Collins and Yearley" in *Science as Practice and Culture* (Ed. Pickering A. Chicago and London: University of Chicago Press) pp343-368.

Law, J and Hassard, J (1999), *Actor-Network Theory and After* (Oxford: Blackwell) (More advanced reading – including Latour claiming that all the terms in actor-network theory, including the hyphen, are problematic).

## Week 5. Science and Identity: Gender, Postcolonialism, Disability

Feminist critiques of science have historically developed outside of mainstream sociology of science, despite the overlap in perspectives. Studies range from institutional questions (why so few women in science?) to epistemological questions (is there a distinctly feminist science?). Feminist analyses of science form a burgeoning literature. Other inequalities in science remain relatively under-researched but are recently beginning to receive greater attention.

### Essential Reading:

Star, S. L. (1990) 'Power, Technology and the Phenomenology of Conventions: On being Allergic to Onions', *The Sociological Review*, 38(1\_suppl), pp. 26–56.

### Bringing the discussion up to date:

Grzanka, P. R., Brian, J. D., & Bhatia, R. (2023). Intersectionality and Science and Technology Studies. *Science, Technology, & Human Values*, 0(0). <https://doi-org.libproxy.ucl.ac.uk/10.1177/01622439231201707>

### Textbook Reading

Either

SY – Chapter 5 OR

SS – Chapter 13 OR

MD – Chapter 5

### Starting points for further reading and class presentation:

Felt, U et al (eds) (2016), *The Handbook of Science and Technology Studies* (Fourth Edition) (2016) (Cambridge Mass: MIT Press): Chapters 11,12, 13, 14, 23,24 depending on your interests deal with race and ethnicity; gender and sexuality; postcolonialism and development. [E-book UCL Library]

Galis, Vasilis (2011) Enacting disability: how can science and technology studies inform disability studies?, *Disability & Society*, 26:7, 825-838 (Download available from <https://www.researchgate.net/publication/254245399> Enacting disability how can science and technology studies inform disability studies )

### Additional Reading:

*General*

Schiebinger, L (1999), *Has Feminism Changed Science?* (Harvard Univ. Press) (esp. Sections II and III)

Howell, A. (2018), 'Forget "militarization": race, disability and the "martial politics" of the police and of the university' *International Feminist Journal of Politics* 20, no. 2: 117-136.

Haraway, D (1988), 'Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective', *Feminist Studies* 14, no. 3: 575-599. [Electronic copy available on course e-reading list on Moodle]

Hacking, I. (1986), 'Making Up People'. In T. Heller et al. (eds), *Reconstructing Individualism*. Stanford: Stanford University Press.

### *Sexuality*

Moldrem, S. and Thakor, M. (2017). Genealogies and Futures of Queer STS: Issues in Theory, Method, and Institutionalization. *Catalyst: Feminism, Theory, Technoscience*, 3(1)1-15  
<https://catalystjournal.org/index.php/catalyst/article/view/28795>

Oudshoorn, N (2004), "Astronauts in the Sperm World": The Renegotiation of Masculine Identities in Discourses on Male Contraceptives, *Men and Masculinities*, Vol. 6, No. 4, 349-367

Westhaver, R. (2010). "A Kind of Sorting Out": Crystal Methamphetamine, Gay Men, and Health Promotion." *Science, Technology, & Human Values* 36(2): 160-189.

### *Race and Postcolonialism*

Said, E. (1978), 'Knowing the Oriental' in *Orientalism* (First Vintage Books Edition 1979), 31-49. Classic text in postcolonial studies; think about the role science and technology might play in Said's analysis.

Hardin, S. (2008), *Sciences From Below: Feminisms, Postcolonialisms and Modernities*. (Ch. 5)

Lanzarotta, T (2020), 'Ethics in retrospect: Biomedical research, colonial violence, and Iñupiat sovereignty in the Alaskan Arctic', *Social Studies of Science*, Volume: 50 issue: 5, page(s): 778-801.

Jasanoff, S. (2006). "Biotechnology and Empire: The Global Power of Seeds and Science", *Osiris* 21: 273-292. For an article that brings together postcolonialism and co-production.

Merson, J (2000) 'Bio-Prospecting or Bio-Piracy: Intellectual Property Rights and Biodiversity in a Colonial and Postcolonial Context'. *Osiris* 15: 282-296.

Reardon, J and Tallbear, (2012), " 'Your DNA Is Our History': Genomics, Anthropology, and the Construction of Whiteness as Property ", *Current Anthropology*, Vol. 53, No. S5 pp. pp. S233-S245

## Disability

Velho, Raquel (2021). “‘They’re changing the network just by being there’: reconsidering infrastructures through the frame of disability studies.” *Disability Studies Quarterly* (2021). Available [here](#). [Open access.]

Raquel Velho (2023), *Hacking the Underground : Disability, Infrastructure, and London's Public Transport System* (Seattle : University of Durham) Intro and Chapter 3.

McGuire, C. (2017). Inventing Amplified Telephony: The Co-Creation Of Aural Technology And Disability. In C. L. Jones (Ed.), *Rethinking modern prostheses in Anglo-American commodity cultures, 1820–1939* (pp. 70–90). Manchester University Press.  
<http://www.jstor.org/stable/j.ctv18b5gt5.10>

Viridi, Jaipreet (2020) “Material Traces of Disability: Andrew Gawley's Steel Hands,” *Nuncius: Journal of the Material and Visual History of Science* 35.4 (2020): 606-631.

## Week 6. Reading Week – No Class

### Week 7. STS and Technology: 1

#### The Social Construction of Technology

Having thought about how science is constructed, we will continue our examination of the relationship between the social and the natural or technical, to consider ways of thinking about this relationship in the context of constructing technologies.

#### Essential Reading

Trevor J. Pinch; 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. [Also online module Moodle reading list]

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

<https://eprints.lse.ac.uk/28638/1/Introductory%20essay%20%28LSERO%29.pdf>

#### Additional Reading

Winner, Langdon. “Do Artifacts Have Politics?” *Daedalus*, vol. 109, no. 1, 1980, pp. 121–136.

Benjamin, R (2019) *Race after Technology* (Chapter 1) Polity Press. (UCL Library E-book)

Langdon Winner (1993) Upon Opening the Black Box and Finding It Empty: Social Constructivism and the Philosophy of Technology. *Science, Technology, & Human Values* [Vol. 18, No. 3 \(Summer, 1993\)](#), pp. 362-378.

Scannell, R. Joshua (2019). "This Is Not Minority Report: Predictive Policing and Population Racism." *Captivating Technology: Race, Carceral Technoscience, and Liberatory Imagination in Everyday Life*, edited by Ruha Benjamin, Duke University Press, 2019, pp. 107–30. <https://doi.org/10.2307/j.ctv11sn78h.10>

Stirling, A., O'Donovan, C., & Ayre, B. (2018). *Which Way? Who says? Why? Questions on the Multiple Directions of Social Progress*. Available at <http://www.technologystories.org/which-way-who-says-why-questions-on-the-multiple-directions-of-social-progress/>

Brooks, H (1994) 'The relationship between science and technology'. *Research Policy*, 23, 477-486, <http://sjbae.pbworks.com/f/brooks%2B1994.pdf>

Cowan RS (1985), 'How the Refrigerator Got Its Hum' in *The Social Shaping of Technology (1st edition)* (Milton Keynes: Open University Press) pp202-218 (Detailed case study of how technology is affected by social forces).

Nye, D (2007) *Technology Matters: Questions to Live With* (Cambridge Mass: MIT Press) Chapter 4 'How Do Historians Understand Technology?') (UCL Library E-book)

Wyatt, S (2007), 'Technological Determinism Is Dead; Long Live Technological Determinism' in Hackett, EJ (et al), *The Handbook of Science and Technology studies* (Cambridge, Mass. : MIT Press) (3rd ed) (UCL Library E-book)

Pool, R (1997), *Beyond Engineering: How Society Shapes Technology* (OUP), (Chapter 5 'Choices' for lots of examples such as VHS and QWERTY keyboard). [UCL Library E-book]

## **Week 8. STS and Technology: 2**

### **Case Study: How STS Studies Military and Security Technologies**

We continue to examine the sociology of technology by focussing in on a generic class of technologies related to the military and security. The aim is to provide an overview of how diverse STS perspectives have approached the question of where military technologies come from and how they have been shaped by broader social, political and economic factors.

#### **Essential Reading**

Grint, K. and Woolgar, S. (1997). 'What's Social About Being Shot?' in *The Machine at Work*. Cambridge, UK: Polity Press. pp140-168 [Moodle digital reading list]

#### **Additional Reading**

Matthew Ford (2017), *Weapon of Choice: Small Arms and the Culture of Military Innovation* (London: Hurst) (UCL Library E-book) Chapter 1 is good background on different approaches to sociology of technology.

McCarthy, D (2018), *Technology and World Politics: An Introduction* (London: Routledge) Chapters 2 and 3 introduce social shaping and ANT in a security studies context. [UCL library E-book]

Alex Roland, (2010). Was the Nuclear Arms Race Deterministic?. *Technology and Culture*, 51(2), pp.444-461.

Weber, Rachel (1997) "Manufacturing Gender in Commercial and Military Cockpit Design," *Science, Technology and Human Values* 23: 235-53.

Hecht, G (2012), *Being Nuclear: Africans and the Global Uranium Trade* (Cambridge Mass. MIT Press). Chapter 1. Introduction: The Power of Nuclear Things [UCL Library E-book].

*Asks: When does uranium count as a nuclear thing? When does it lose that status? And what does Africa have to do with it?*

Vogel, Kathleen *et al* (2017), "Knowledge and Security", in *The Handbook of Science and Technology Studies* 4<sup>th</sup>, edited by Ulrike Felt *et al*. Cambridge MA: MIT Press, 2017, Section V, 973-100. [Overview of the field from an STS perspective] [UCL Library E-book]

Daniel Neyland & Norma Möllers (2017) 'Algorithmic IF ... THEN rules and the conditions and consequences of power', *Information, Communication & Society*, 20:1, 45-62.

Schouten, P. Security as controversy: Reassembling security at Amsterdam Airport, *Security Dialogue* 2014, Vol. 45(1) 23–42

Leander, Anna (2013), Technological Agency in the Co-Constitution of Legal Expertise and the US Drone Program, *Leiden Journal of International Law*; Cambridge Vol. 26, Iss. 4, (Dec 2013): 811- 831.

Edler, Daniel (2021), The Making of Crime Predictions: Sociotechnical Assemblages and the Controversies of Governing Future Crime, *Surveillance & Society* 19(2): 199-215.

*Specific Case Studies Discussed in the Lecture:*

Collins, H. and Pinch, T. (1998). 'A Clean Kill? : The role of Patriot in the Gulf War', *The Golem at Large*. Cambridge, U.K.: Cambridge University Press. [UCL Library E-book]

Janet Abbate, 'Cold war and white heat: the origins and meanings of packet switching' in MacKenzie and Wajcman (eds.) *The Social Shaping of Technology* (2<sup>nd</sup> Edition), 1999, Chapter 25.

[https://eecs.wsu.edu/~taylorm/2012\\_VAST/Abbate.Cold.War.and.White.Heat.Packet.Switching.pdf](https://eecs.wsu.edu/~taylorm/2012_VAST/Abbate.Cold.War.and.White.Heat.Packet.Switching.pdf)

Paul Forman, 'Behind Quantum Electronics: National security as basis for physical research in the United States, 1940-1960', *Historical Studies in the Physical and Biological Sciences* (1987) 18(1) pp.149-229 .

Lynn White, *Medieval Technology and Social Change*, London: Oxford University Press, 1976.  
(For the stirrup case.)

## Week 9. Counting and Objectivity

Science -and in particular the numbers and data it relies upon - is often seen as an objective way of looking at the world. In this week's class, we will look at the work that goes into constructing the measures, numbers and the objectivity that science relies upon and considers what this means for power and authority.

### Essential Reading

Martin, A. and Lynch, M. (2009). Counting Things and People: The Practices and Politics of Counting. *Social Problems*, 56(2), pp.243-266.

### Additional Reading

Daston L, Galison P. (1992) The Image of Objectivity. *Representations*  
[No. 40, Special Issue: Seeing Science \(Autumn, 1992\)](#), pp. 81-128.

Benjamin, R (2019) *Race after Technology* (Chapter 1) Polity Press. (UCL Library E-book)

Porter, T. (1992) Quantification and the Accounting Ideal in Science in *Social Studies of Science* 22(4) 633-651.

Porter, T (1995), *Trust in Numbers* (Princeton, NJ: Princeton University Press, 1995), Ch. 7 ("U.S. Army Engineers and the Rise of Cost-Benefit Analysis"), pp. 148-189. UCL Library (E-book)

Nelson, D (2015), *Who Counts? The Mathematics of Death and Life after Genocide* (Washington: Duke University Press) – especially Part I (Chapters 0 and 1) and Part II (Chapter 2 and 3) [UCL Library E-book]

Rappert, B (2021). Counting the dead and making the dead count: configuring data and accountability. *History and Philosophy of the Life Sciences* **43**, 62.  
<https://doi.org/10.1007/s40656-021-00415-5>

Rappert, B. (2012). States of ignorance: the unmaking and remaking of death tolls. *Economy and Society*, 41(1), pp.42-63.

Miller, Clark A (2004), 'Interrogating the Civic Epistemology of American Democracy: Stability and Instability in the 2000 US Presidential Election', *Social Studies of Science* Volume: 34 issue: 4, page(s): 501-530.

Martin, A (2004), 'Can't Any Body Count?: Counting as an Epistemic Theme in the History of Human Chromosomes', *Social Studies of Science*, Volume: 34 issue: 6, page(s): 923-948

Sharkey, N and Suchman, L (2013), [Wishful mnemonics and autonomous killing machines](#). *Proceedings of the AISB*, Vol. 136 (05) p. 14-22.

Tim Rhodes & Kari Lancaster (2020) Mathematical models as public troubles in COVID-19 infection control: following the numbers, *Health Sociology Review*, 29:2, 177-194

Schoot, I. and Mather, C. (2022) 'Opening Up Containment', *Science, Technology, & Human Values*. 2022;47(5):937-959. doi: 10.1177/15589447221084011. [Article on counting escaped salmon – pay particular attention to section 'Monitoring Containment']

## **Week 10. Expertise, Co-production and Boundaries**

This week we look at the role of expertise beyond research sites – particularly in relation to science and politics. We will explore the sociological 'boundary-work' that goes into making science separate from other areas of expertise. We also turn to a growing body of literature in STS working within the idiom of 'co-production'. Put briefly, this school of thought believes that we gain explanatory power by thinking of natural and social order as being produced together – that we cannot separate the ways we know and represent the world from how we choose to live in it.

### **Essential Readings**

Gieryn TF (1983), "Boundary Work and the Demarcation of Science from Non-Science: Strains and Interests in the Professional Ideologies of Scientists", *American Sociological Review* Vol.48 pp781-795

Jasanoff, S. (2004), 'Ordering knowledge, ordering society' in S Jasanoff (ed.), *States of Knowledge: The co-production of science and social order* (London, New York: Routledge), 14-45. [E-book UCL Library]

### **Bringing the debate up to date**

Pereira, M. do M. (2019) 'Boundary-work that Does Not Work: Social Inequalities and the Non-performativity of Scientific Boundary-work', *Science, Technology, & Human Values*, 44(2), pp. 338–365.

### **Additional Reading**

*Expertise*



Susan Michie, Philip Ball, James Wilsdon & Robert West (2022) Lessons from the UK's handling of Covid-19 for the future of scientific advice to government: a contribution to the UK Covid-19 Public Inquiry, *Contemporary Social Science*, 17:5, 418-433, DOI: [10.1080/21582041.2022.2150284](https://doi.org/10.1080/21582041.2022.2150284)

Smallman, Melanie; (2023) Science to the Rescue? *Social Research: An International Quarterly*, 90 (1) pp. 151-173.

Collins, H. M. and Evans, R. (2002) 'The Third Wave of Science Studies: Studies of Expertise and Experience', *Social Studies of Science*, 32(2), pp. 235–296.

And

Wynne, B. (2003) 'Seasick on the Third Wave? Subverting the Hegemony of Propositionalism: Response to Collins & Evans (2002)', *Social Studies of Science*, 33(3), pp. 401–417.

Or

Jasanoff, S. (2003) 'Breaking the Waves in Science Studies: Comment on H.M. Collins and Robert Evans, "The Third Wave of Science Studies"', *Social Studies of Science*, 33(3), pp. 389–400.

Wynne, B. (1998) 'May the Sheep Safely Graze? A Reflexive View of the Expert–Lay Knowledge Divide', in *Risk, Environment and Modernity: Towards a New Ecology*. London: SAGE Publications Ltd, pp. 44–83. (available as an ebook)

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), pp. 408–437.

Colman E, Wanat M, Goossens H, *et al* (2021), 'Following the science? Views from scientists on government advisory boards during the COVID-19 pandemic: a qualitative interview study in five European countries', *BMJ Global Health* 2021;6:e006928. [Online open access] [Not specifically written from an STS perspective, but interesting – think about how the concepts introduced in the lecture and other readings might apply]

Hilgartner S, Miller, Clark A and Hagendijk, R (2015), 'Introduction' in *Science and Democracy: Making Knowledge and Making Power in the Biosciences and Beyond* (Routledge),

Mol, A (1999). "Ontological politics. A word and some questions", *The Sociological Review* 47(1\_suppl): 74-89. A more complex philosophical read, but good if you want to think about how ontologies are inseparable from politics, such that ontologies can be multiple.

Mahony, M (2014), 'The predictive state: Science, territory and the future of the Indian climate', *Social Studies of Science* 44, no. 1: 109-133.

*Co-production*

S. Shapin and S. Schaffer, *Leviathan and the Air-Pump* (Princeton: Princeton University Press, 1985), Ch. 8 (“The Polity of Science: Conclusions”), pp. 332-344. [UCL Library E-book]

Rabeharisoa, V and Callon, M (2003) ‘Patients and scientists in French muscular dystrophy research’ in S Jasanoff (ed.), *States of Knowledge: The co-production of science and social order* (London, New York: Routledge), 142-160. A nice case study showing knowledge and collective (social) mobilisations as conjointly produced. [E-book UCL Library]

For a nice case study to compare with that in the above reading, see:

Stockdale, A and Terry, Sharon F (2002), ‘Advocacy Groups and the New Genetics’ in JS Alper et al (eds.), *The Double-Edged Helix: Social Implications of Genetics in a Diverse Society* (John Hopkins University Press), 80-101.

Reardon, J. (2011), ‘Human Population Genomics and the Dilemma of Difference’ in S Jasanoff (ed.), *Reframing Rights: Bioconstitutionalism in the Genetic Age* (Cambridge, MA; London: MIT Press), 217-238. Takes a comparative approach to co-production to demonstrate how certain forms of knowledge (and therefore social rights) get foregrounded or erased in scientific research projects. (E-version in Moodle module reading list)

Reardon, J (2001), ‘The Human Genome Diversity Project: A Case Study in Coproduction’, *Social Studies of Science*, Vol.31 No.3 pp.357-388 (On the simultaneous production of social and natural categories, together with the boundary between them).

Balmer, B, Spelling, A and McLeish, C (2018), ‘Tear Gas Epistemology: The Himsworth Committee and Weapons as Drugs’ in A Mankoo and B Rappert (eds.), *Chemical Bodies, The Techno-politics of Control* (London: Rowman & Littlefield), 103-124. Draws from literature in co-production to show how Britain came to categorise CS tear gas as more akin to a drug than a weapon.

### *Boundaries*

Jasanoff, S (1987), ‘Contested Boundaries in Policy-Relevant Science’, *Social Studies of Science* Vol.17 pp195-230 (Complex but excellent argument on the shifting and negotiable boundary between science and politics)

Addison, C (2017), Spliced: Boundary-work and the establishment of human gene therapy, *BioSocieties* June 2017, Volume 12, Issue 2, pp 257–281

Lindberg, K *et al* (2017), Performing boundary work: The emergence of a new practice in a hybrid operating room, *Social Science & Medicine*, Volume 182: 81-88

## **Week 11. Non-Knowledge: Secrecy, Ignorance and Absence**

STS has recently turned from looking at the construction on knowledge to also look at various forms of ‘non-knowledge’. If there can be a sociology of scientific knowledge, can there

equally be a sociology of ignorance? With respect to secrecy, a combination of STS with the geography of knowledge has promised to re-think the dynamics of secrecy.

### **Essential Reading:**

Galison, P (2004) "Removing knowledge", *Critical Inquiry*, 31(1), 229-43.

Gross, M and McGoey L (eds) (2015) *Routledge International Handbook of Ignorance Studies* (London: Routledge), Introduction (pp1-12). (E-book UCL Library)

### **Additional Reading:**

Katharina T. Paul, Samantha Vanderslott & Matthias Gross (2022) Institutionalised ignorance in policy and regulation, *Science as Culture*, 31:4, 419-432, DOI: [10.1080/09505431.2022.2143343](https://doi.org/10.1080/09505431.2022.2143343)

Paglen, T. (2010). Goatsucker: toward a spatial theory of state secrecy. *Environment and Planning D: Society and Space*, 28(5), pp.759-771.

Kempener, J (2011), 'Forbidden Knowledge: Public Controversy and the Production of Nonknowledge', *Sociological Forum* 26(3): 475-500.

Holmberg, T and Ideland, M (2012), 'Secrets and lies: "selective openness" in the apparatus of animal experimentation', *Public Understanding of Science* vol. 21 no. 3: 354-368

Balmer, B (2012), *Secrecy and Science: A Historical Sociology of Biological and Chemical Warfare* (Farnham: Ashgate) (Chapter 1 for a review of literature on science and secrecy).

Merton, R. (1973) The normative structure of science, in N Storer (ed.) *The Sociology of Science: Theoretical and Empirical Investigations* (Chicago: University of Chicago Press), 267-78. <https://www.panarchy.org/merton/science.html>

Robert N. Proctor, R and Londa Schiebinger, L (2008), *Agnology: The Making and Unmaking of Ignorance* (Stanford: Stanford University Press)

Conway, E and Oreskes, N (2012) *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming* (London: Bloomsbury).

Revill, J and Edwards, B (2015), 'What counts as the Hostile Use of Chemicals?', in Rappert, B. and Balmer, B (eds) *Absence in science, security and policy: From research agendas to global strategy* (Basingstoke: Palgrave) Chapter 8. [digitized on Moodle]

Nina Witjes and Philipp Olbrich (2017), 'A fragile transparency: satellite imagery analysis, non-state actors, and visual representations of security', *Science and Public Policy*, Volume 44, Issue 4, 1 August 2017, Pages 524–534

Aradau, C (2017)' Assembling (non)knowledge: security, law, and surveillance in a digital world' *International Political Sociology* 11:327-42.

## ASSIGNMENTS FOR SOCIOLOGY OF SCIENCE & TECHNOLOGY

Assignments should be word-processed, 12 point type, minimum 1.5 line-spaced, with page numbers added and with a word count at the end.

You should familiarise yourself with UCL rules on academic integrity and plagiarism. If you have not already taken the UCL academic integrity online course (20 mins approx.) then take the time to complete it: <https://moodle.ucl.ac.uk/enrol/index.php?id=17435>

See advice on Moodle (under Assessments section) about how to write essays, resources for study skills, developing a reading strategy, critical thinking etc.

### Use of AI

It is important you **do not use** AI tools to generate an essay and submit it as if it was your own work. UCL has this briefing, which explains **how AI might be used** and **how to acknowledge** its use. You must read this if you intend to use AI tools to support your essay writing:

<https://www.ucl.ac.uk/teaching-learning/generative-ai-hub/using-ai-tools-assessment#AIGuidance>

The assignments on this module fall into UCL Category 2:

Category 2: AI tools can be used in an assistive role

**Students are permitted to use AI tools for specific defined processes within the assessment.**

AI tools can be utilised to support the development of specific skills as required by the assessment. Students can leverage AI for tasks such as data analysis, pattern recognition, or generating insights. There will be some aspects of the assessment where the use of AI is inappropriate (see briefing above).

Examples of where AI might be used in an assistive category include:

- drafting and structure content;
- supporting the writing process in a limited manner;
- giving feedback on content, or proofreading content.
- getting over writer's block.

Remember AI will NOT think for you – the best essays will contain evidence of your own critical thinking, analysis and argument.

Misuse or unacknowledged use of AI tools constitutes academic misconduct and can lead to penalties and even expulsion from UCL. <https://www.ucl.ac.uk/students/exams-and-assessments/academic-integrity/about-academic-misconduct>

**It is important to read the UCL Briefing on use of AI (see link above) so that any use of AI is transparent and acknowledged.**

## Assignment 1: 1000 word presentation write-up.

Your assignment should be based on an individual write-up of the group presentation you give for the 'Science and Identity' topic in week 5. However, your own write-up needs to go beyond simply repeating the content of the group presentation:

1. Have an overall message or argument. What is the main thing you want to persuade the reader about this topic?
2. Have a title that reflects this overall message – think of this as a 'headline'
3. Go beyond the assigned piece of reading – incorporating material from the module reading list or beyond. As a guideline, for a short piece such as this assignment you might include 3-5 more references (but this is just a guideline).
4. Include critical thinking – what are the strengths and weaknesses of the material you are discussing.
5. Make sure your focus is on sociology of science and/or technology. You can draw on wider contextual reading about inequalities and social justice, but link this back to science and technology.

Format:

You can either write up the presentation as a 1000 word essay (particularly if you want to move beyond the structure of the presentation) or follow the presentation structure closely. Quotes or bullet points taken directly from your group presentation will NOT count as plagiarism but should clearly be labelled '(from group presentation)' or just '(GP)'. *However, a write-up that simply repeats the presentation content and nothing more will not pass.*

Your assignment should be no more than 1000 words long with a list of references at the end (these are **not** included in word count).

NB: If you did not attend the seminar then you must produce documented evidence of mitigating circumstances otherwise your mark will be capped at 40%.

You will receive an individual (rather than group) mark for your write-up.

## Assignment 2: 3000-word in-depth essay

Your essay should be no more than 3000 words long with a list of references at the end. Do not include references in your word count. You are expected to read widely (from the syllabus and outside of it if you wish) for this assignment in order to answer the question you choose *in a way that demonstrates a critical understanding of the course material*. Wherever possible your essays should discuss empirical case studies from the academic literature.

**You should also cross-reference to lecture slides (Topic and Slide Number – Slides are on Moodle), other material on the Moodle site, seminar discussion and any other module materials.**

*I am also open to you choosing your own essay topic, but you must discuss it with me first during office hours to ensure it relates to the course themes. Whether or not you choose your own title, your essay should demonstrate engagement with material covered on the module.*

Note: There are no essay questions for Week 5 as this formed the core of assignment 1.

Suggested titles:

1. In the twenty-first century, is there any point in studying Merton and other functionalist studies of the scientific community?
2. "What was strong about the Strong programme was its insistence that social science should treat all kinds of knowledge equally." (Yearley 2005)

Explain what Yearley is claiming here about the Strong Programme and assess whether the programme succeeded in its analysis of scientific knowledge.

3. What are the strengths and limitations of employing ethnographic methods in the sociology of science?  
[Note your essay should relate directly to sociology of science, a general essay on ethnographic methods in social science is unlikely to receive a good mark]
4. What does it mean to claim that science is socially constructed? Does it matter whether or not the claim is true?
5. Once we finish "following the scientists" as Actor-Network Theory would wish, do we understand anything new or interesting about the relationship between science and society?
6. How do technological objects come to embody, and then reinforce, particular values and norms held by groups in society? How successfully has sociology of technology answered this question?
7. We looked at how STS studies military and security technologies. Select one other area of technology and evaluate how well STS has engaged with analysing that area of technology. Examples might be health technologies, environmental technologies, artificial intelligence, domestic technologies etc.
8. "Mathematics is and are inseparable from politics" (Nelson 2015, p4). Critically discuss this claim in relation to counting casualties during and after war.
9. Do science advisors 'speak truth to power' in regulatory or policy disputes involving science and technology? Explain your answer.

10. "During the COVID-19 pandemic, the statement of 'following the science' has been used by politicians as both a shorthand for a new, 'better' era of politics, where government decisions will be based on scientists' and public health experts' advice" (Colman *et al* 2021)

Based on your wider reading of the scholarly STS literature on scientific expert advice, what would be your response to this claim by politicians?

11. Briefly explain the concept of 'boundary-work' in science. Why, if at all, does it matter how scientists draw boundaries around science?
12. Briefly explain what co-production in STS means. Write a co-productionist analysis of a technology/scientific development of your choice.  
(Where you cannot get information about your chosen technology/scientific development, you can speculate on what research you would undertake to provide answers or raise new questions from a co-production standpoint).
13. Is secret science simply open science done behind closed doors?