HPSC0039 Science, Warfare & Peace

Course Syllabus

Course Information

This module explores the relationships between science, war and the prevention of war. It will place military and security technologies within social, political, and historical contexts. There is particular emphasis on the twentieth and twenty-first centuries and on weapons usually designated as `unconventional' or `weapons of mass destruction'. In addition to thinking about how science, technology and warfare have shaped each other, this module also considers the changing role of the scientist in relation to the state, and considers broader themes such as the arms control, disarmament, ethics, and popular culture in relation to war.

Basic course information

Course website:	On Moodle
Moodle Web site:	Search 'HPSC0039'
Assessment:	This term's course will be assessed on the basis of *one* written assignments: review (70%) and a short review (30%).
Timetable:	www.ucl.ac.uk/timetable
Prerequisites:	no pre-requisites, course designed primarily for year 3 undergraduate students
Required texts:	See reading list
Course tutor:	Professor Brian Balmer
Contact:	b.balmer@ucl.ac.uk
Web:	https://www.ucl.ac.uk/sts/people/professor-brian-balmer
Office location:	22 Gordon Square, Room 2.1
Office hours:	See Moodle or Staff Website (above)

Schedule

UCL Week	Topic	Study Dates
21	Science: Technology: War: Security	8-11 Jan
22	Are scientists responsible for the weapons they create?	12-18 Jan NB Lecture on 15 Jan
23	'Duck and Cover': Atomic Weapons, Armament and Disarmament	19-25 Jan
24	Can weapons successfully be prohibited? Chemical and Biological Warfare	26 Jan-1 Feb
25	What is a Weapon? How STS studies military and security technologies	2 Feb -8 Feb
26	**Reading Week**	12-16 Feb
27	Tacit Knowledge: Can Weapons be Un-Invented?	19-22 Feb
28	Ignorance in Action: Non-Knowledge, Secrecy and Absence	23-29 Feb
29	Automatic War	1-7 Mar
30	War Every Day: The Securitisation of Everyday Life	8-14 Mar
31	After War: Who counts the dead?	15-21 Mar

Assessments

Summary

	Description	Deadline	Word limit	Feedback by
1	Essay (70%)	15 April 2024 17.00 hrs*	2500	https://www.ucl.ac.uk/academic-manual/chapters/chapter-4-assessment-framework-taught-programmes/section-8-assessment-feedback
2	Review (30%) [Due Term 3]	7 May 2024 17.00 hrs*	1000	

*provisional dates. All deadlines are checked by the professional service staff to try and avoid clashes. Dates will be confirmed on Moodle shortly after term starts.

There will be a short (200 word) formative assessment (i.e. no mark given) due over reading week (17.00 hrs 14 Nov) to help you with the long essay assignment.

Full details and instructions are at the end of this document.

Assignments

This term's module will be assessed on the basis of *two* written assignments (see above and end of this document). For the long essay, you are encouraged to develop your own essay question but a list of topics and example essay questions is included with this reading list. Students may discuss any aspects of their essays with me during my office hours. Your long essay is expected to show evidence of <u>wide reading</u> (including relevant material from beyond the reading list) and <u>critical thought</u> in your essays.

Full details and instructions are at the end of this document

Essays must be submitted via Moodle. In order to be deemed 'complete' on this module students must attempt both assignments.

See the www.ucl.ac.uk/sts/handbook for late penalties and over-length penalties<u>.</u>

Criteria for assessment

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

Aims & objectives

This course investigates the relationship between science, technology and war, primarily using intellectual tools from history, philosophy and sociology of science. The course explores military science and technologies in their social, political and historical context, and focuses mainly on the twentieth and twenty-first centuries.

By the end of this course you should:

- Be able to apply critical thinking to understanding issues around science, technology, war and security. In particular, perspectives from history and sociology of science.
- Understand how more general STS concepts and theories (such as social shaping of technology, actor-network theory, tacit knowledge, non-knowledge etc) can be applied to military-security technology and science.
- Have developed knowledge of the history and governance of modern military technologies, particularly so-called weapons of mass destruction (chemical, biological, nuclear).
- Have been able to write an extended essay on topics relevant to the course

Course expectations

See UCL Timetable for time and locations of sessions.

There will be a reading week, with no lectures or seminars, see course schedule.

Please note that electronic recording of lectures is not permitted without permission from the course tutor.

Reading for this course: The notes that you take in lectures will not be detailed enough to understand a topic or to write an assignment on that topic. It is therefore essential that you make use of the reading list. You are *not* expected to read all of the material. You will be expected to read at least one piece each week in preparation for class and you will certainly need to read widely for your essays and may include material from beyond the reading list. However, read <u>critically</u>: you don't have to read everything, you can agree or disagree with everything you read – but you should

be able to say why you hold your views and where possible use other things you have read to support your reasons.

Where to find the reading material*:* There is no one text which covers this course. Most of the reading material is electronically available through DMS Watson library or through e-books and on-line electronic journals accessible through the library web-site.

A small number of more difficult to find readings [marked on the reading list] have been digitized by the Library and can be obtained by clicking on the link to the Online Reading List on the Moodle page – it is on the right hand side under Library Resources.

There is also useful material kept in **Senate House Library** which you can obtain a library card with your UCL Identity Card.

You are also encouraged to use the internet for research. However, make sure you reference the full web address, the site title and date visited. Be critical of what you read and be careful of purely descriptive sites such as Wikipedia – I will be looking for evidence of some hard thinking and argument in your essays, not simple regurgitation of basic information. Also note that plagiarism, particularly involving internet sources, will be treated as a severe exam irregularity.

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 familiarise themselves with these policies.

1. Science: Technology: War: Security

*"I know not with what weapons World War III will be fought,
but World War IV will be fought with sticks and stones."*
Albert Einstein

Essential Reading:

Kaldor, M (2013) 'In defence of new wars', *Stability: International Journal of Security and Development* 2(1) [Open Access Online]

Additional Reading

Roland, A (2003) 'Science, technology, and war', in Mary Jo Nye (ed.), *The Cambridge History of Science. Volume 5: The Modern Physical and Mathematical Sciences*, Cambridge: Cambridge University Press, pp.561-578.
(Very useful, if compressed, summary of relationships between science, technology and war in C20th century) [UCL library E-book]

David Edgerton, 'Significance', 'War', and 'Killing' in *The Shock of the Old: Technology and Global History since 1900,* London: Profile Books, 2006. [War chapter in digital Moodle readings]

Kaldor, M. (2007). *New and Old Wars*. Stanford, Calif.: Stanford University Press.
(Post-cold war) [UCL Library E-book]

2. Are scientists responsible for the weapons they create?

"Now I am become death, the destroyer of worlds"
J. Robert Oppenheimer (1965, recalling a phrase from the Hindu scriptures
at the first test of the atomic bomb, 1945)

"When you see something that is technically sweet, you go ahead and do it and you argue about
what to do about it only after you have had your technical success.
That is the way it was with the atomic bomb."
J. Robert Oppenheimer (1954)

Essential Reading:

Thorpe, C. (2004). Violence and the Scientific Vocation. *Theory, Culture & Society*, 21(3), pp.59-84.

Additional Reading

Scientists and the Use of Weapons

Thorpe, C (2007), *Oppenheimer: The Tragic Intellect*, (Chicago: University of Chicago Press) chapters 6 and 7. (UCL library E-book)
(Analyses physicist J. Robert Oppenheimer's views on the moral responsibility of the scientist)

Balmer, B (2002) 'Killing "Without the Distressing Preliminaries": Scientists' Defence of the British Biological Warfare Programme', *Minerva* (2002) 40, pp57-75

Mitcham, C. (1989), The Spectrum of Ethical Issues Associated with the Military Support of Science and Technology. *Annals of the New York Academy of Sciences*, 577: 1-9. https://doi-org.libproxy.ucl.ac.uk/10.1111/j.1749-6632.1989.tb15043.x (This is part of a special issue *Ethical Issues Associated with Scientific and Technological Research for the Military* – See Kemp and Roth for contrasting views. Look over the contents page for more if you are doing an assignment on this topic).

Gusterson, H (1998) *Nuclear Rites: A Weapons Laboratory at the End of the Cold War* (Berkeley: University of California Press), (Chapter 3 'Becoming a Weapons Scientist')(Moodle reading list digitized).

Szöllösi-Janze M. (2017) 'The Scientist as Expert: Fritz Haber and German Chemical Warfare During the First World War and Beyond'. In: Friedrich B., Hoffmann D., Renn J., Schmaltz F., Wolf M. (eds) *One Hundred Years of Chemical Warfare: Research, Deployment, Consequences*. (Springer, Cham)(Open Access)
https://link.springer.com/chapter/10.1007/978-3-319-51664-6_2

Herrlich, P. (2013), The responsibility of the scientist. *EMBO reports*, 14: 759-764. https://doi.org/10.1038/embor.2013.116

Brown, A (2012), *Keeper of the Nuclear Conscience: the Life and Work of Joseph Rotblat* (Oxford: Oxford University Press) (Chapters 3-4) (UCL Library E-book) (Rotblat, a nuclear physicist, quit the Manhattan Project).

Bridger, S. (2015). *Scientists at War: The Ethics of Cold War Weapons Research* (Cambridge MA: Harvard University Press) (Chapters 3-4) (UCL Library E-book).

Douglas, H (2009), *Science, Policy, and the Value Free Ideal* (Chapters 4-5) (A relevant but more general discussion of whether science should be value-free) (UCL Library E-book)

Human Experiments and the Military

Lindee, S(1999), 'The Repatriation of Atomic Bomb Victim Body Parts to Japan: Natural Objects and Diplomacy," *Osiris* 13, pp.376-409.
(Argues that the material body parts from bomb victims, and the way they are (mis)treated, are a way of 'instantiating' (i.e. making concrete) abstract ideas such as victory in war).

Schmidt, U. (2006). 'Cold War at Porton Down: Informed Consent in Britain's Biological and Chemical Warfare Experiment.' *Cambridge Quarterly for Healthcare Ethics*, 15:366-380.

Kaufman, S.R (1997). 'The World War II Plutonium Experiments: Contested Stories and their Lessons for Medical Research and Informed Consent'. *Culture, Medicine and Psychiatry* 21 (2), 161–197.

Alex Mankoo (2018), "Controlling and Caring for Public Bodies: Gas Tests in WWII Britain," in *Chemical Bodies: The Techno-Politics of Control* (Rowman and Littlefield, 2018) (Digitized Moodle Reading List).

Moreno, J (2001), *Undue Risk: Secret State Experiments on Humans* (New York: Routledge) (UCL Library E-book)

3.   'Duck and Cover': Atomic Weapons, Armament and Disarmament

"The only use for an atomic bomb is to keep somebody else from using one."
George Wald

Essential Reading

Wolfe, A (2018), *Freedom's Laboratory: The Cold War Struggle for the Soul of Science* (Baltimore: Johns Hopkins University Press) Chapter 6 ('Science For Diplomacy') pp113-34 (Moodle Digital Reading List).

Additional Reading

Siracusa, JM (2015) *Nuclear Weapons: A Very Short Introduction* (Oxford: OUP).
(The 2008 edition is available as an e-book through Senate House Library: https://bit.ly/36dlD8m)

Pilat J.F. (2014) 'Nuclear Science and Technology: The Race Between Weapons and Controls'. In: Mayer M., Carpes M., Knoblich R. (eds) *The Global Politics of Science and Technology - Vol. 1. Global Power Shift (Comparative Analysis and Perspectives)*. Springer, Berlin, Heidelberg.
https://doi.org/10.1007/978-3-642-55007-2_3
https://link.springer.com/chapter/10.1007/978-3-642-55007-2_3#citeas

Lawrence Badash (2003), 'From security blanket to security risk: scientists in the decade after Hiroshima', *History and Technology*, 19(3), pp.241-256.

Alison Kraft (2018), 'Dissenting Scientists in Early Cold War Britain: The "Fallout" Controversy and the Origins of Pugwash, 1954–1957', *Journal of Cold War Studies* Vol. 20, No. 1, pp. 58–100.

Spencer, Metta (1995). "'Political' Scientists." *Bulletin of the Atomic Scientists* 51, no. 4 (July/August 1995): 62-68. (Compare this account with Wolfe's account of Pugwash)

Riesch, H (2021), *Apocalyptic Narratives: Science, Risk and Prophecy* (London: Routledge). Chapter 8 'Nuclear Apocalypse and the Nature of Evil' (UCL Library E-book).

Wittner, L (2009), *Confronting the Bomb: A Short History of the World Disarmament Movement* (Stanford: Stanford University Press) especially Chapters 4-5 (Chapter 5 digitized and on e-reading list).

De-centering dominant perspectives on nuclear weapons

Wittner, L (2000), 'Gender Roles and Nuclear Disarmament Activism, 1954–1965', *Gender & History*, 12(1):197-222.

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?

Biswas, S (2014), *Nuclear Desire: Power and the Postcolonial Nuclear Order* (Minnesota: University of Minnesota Press)

Intondi, V (2020), 'Reflections on Injustice, Racism and the Bomb', *Arms Control Today* Vol.50 (July/August 2020)

https://www.armscontrol.org/act/2020-07/features/reflections-injustice-racism-bomb

Impersonalisation, Bureaucracy and War

Soeters, J (2018), *Sociology and Military Studies: Classical and Current Foundations* (London: Routledge), Chapter 1 (Bureaucracy, leadership and military music) [UCL Library E-book]

Zygmunt Bauman (1989), 'The Uniqueness and Normality of the Holocaust', in *Modernity and the Holocaust*, Cambridge: Polity Press, Chapter 4 [UCL Library E-book].

Carol Cohn (1987), 'Sex and death in the rational world of defense intellectuals', *Signs*, 124, pp.687-718
OR
Carol Cohn (1987), 'Slick'Ems, Glick 'Ems, Christmas Trees, and Cutters: Nuclear Language and How We Learned to Pat the Bomb', *Bulletin of the Atomic Scientists,* 43(5):17-24 (June). [Senate House Library e-journal]

Henry T. Nash (1980) The bureaucratization of homicide, *Bulletin of the Atomic Scientists*, 36:4,22-27 [Senate House Library e-journal]

Slovic, P. (2007). "If I look at the mass I will never act": Psychic numbing and genocide. *Judgment and Decision Making*, 2, 79-95. Available at www.decisionresearch.org

Asaro, Peter M. (2013). "The Labor of Surveillance and Bureaucratized Killing: New Subjectivities of Military Drone Operators." *Social Semiotics* 23 (2): 196–224.

4.   Can weapons successfully be prohibited? Chemical and Biological Warfare

"These important decisions, which have been announced today, have been taken as an initiative toward peace. Mankind already carries in its own hands too many of the seeds of its own destruction. By the examples we set today, we hope to contribute to an atmosphere of peace and understanding between nations and among men."

US President Richard Nixon, announcing the termination of its offensive biological warfare programme and re-affirming its no-first-use policy on chemical weapons (25 Nov 1969)

Essential Reading:

Lentzos, F. (2013). *Hard to Prove: Compliance with the Biological Weapons Convention*. King's College London. https://www.filippalentzos.com/wp-content/uploads/2014/10/Hard-to-Prove-Compliance-with-the-Biological-Weapons-Convention.pdf

Balmer, B (2015), 'The Social Dimension of Technology: The Control of Chemical and Biological Weapons' in Gonzalez, W.J. (ed) *New Perspectives on Technology, Values and Ethics: Theoretical and Practical Discussions*. (Dordrecht: Springer) pp.167-182. [Moodle E-reading list]

Additional Reading

Arms Control Treaties

Glenn Cross & Lynn Klotz (2020) 'Twenty-first century perspectives on the Biological Weapon Convention: Continued relevance or toothless paper tiger', *Bulletin of the Atomic Scientists*, 76:4,185-191

Field, M and English, E (2023), 'Can a 1975 bioweapons ban handle today's bioweapons threats?', *Bulletin of the Atomic Scientists*, 6 March 2023 https://bit.ly/3mBBSI8

Moodie, Amanda (2015), 'In Good Health? The Biological Weapons Convention and the "Medicalization" of Security', *The Nonproliferation Review*, Vol. 22, No.1, pp.71-82.

Enia, J and Fields, J (2014), The Relative Efficacy of the Biological and Chemical Weapon Regimes, *The Non-Proliferation Review* Vol 21(1): 43-64.

Chemical Weapons

POST (2019) *Chemical Weapons*. POSTNOTE Number 596 March 2019 (London: Parliamentary Office of Science and Technology) https://researchbriefings.files.parliament.uk/documents/POST-PN-0596/POST-PN-0596.pdf

Price, Richard. "A Genealogy of the Chemical Weapons Taboo." *International Organization*, vol. 49, no. 1, 1995, pp. 73–103. *JSTOR*, http://www.jstor.org/stable/2706867

Jefferson, C (2014), 'Origins of the Norm against Chemical Weapons'. *International Affairs* Vol 90 No.3, pp. 647–61

Edwards, B. & Cacciatori, M. (2018), The politics of international chemical weapon justice: The case of Syria, 2011-2017, *Contemporary Security Policy*. 39, 2, p. 280-297.

McLeish, C and Balmer, B (2012) 'Discovery of the V-series nerve agents during pesticide research', in Tucker, J (ed) Tucker, J (2012), *Innovation, Dual-Use and Security: Managing the Risks of Emerging Biological and Chemical Technologies* (Cambridge MA: MIT Press) (Chapters 1 and 2).[UCL Library E-book].

Daniel Auerbach; Militarization, Risk, and the Environment: Agent Orange as a Distinct Risk. *Sociology of Development* 2023; doi: https://doi.org/10.1525/sod.2023.0029

Biological Weapons:

Lentzos, F (ed) (2016) *Biological Threats in the Twenty-First Century* (London: World Scientific). Up to date collection covering many aspects of the BW threat [UCL Library E-book]

Guillemin, J (2006-07), '*Scientists and the history of biological weapons*', *EMBO reports*, 2006-07, Vol.7 (S1), p.S45-S49

Dual Use:

Rappert, B. (2014). 'Why has Not There been More Research of Concern?' *Frontiers in Public Health*, 2. [Open Access Online]

Engel-Glatter, S.C. (2014), Dual-use research and the H5N1 bird flu: Is restricting publication the solution to biosecurity issues? *Science and Public Policy* (Volume 41, Issue 3, Pages 370–383

Bezuidenhout, Louise. 2014. "Moving Life Science Ethics Debates beyond National Borders: Some Empirical Observations." *Science and Engineering Ethics* 20 (2): 445–67.

Tucker JB (1994), 'Dilemmas of a Dual-Use Technology: Toxins in Medicine and Warfare', *Politics and the Life Sciences* Vol.13 No.1 pp51-62.

CBW Terrorism

Revill, James (2017). 'Past as Prologue? The Risk of Adoption of Chemical and Biological Weapons by Non-State Actors in the EU'. *European Journal of Risk Regulation* 8, no. 4 pp. 626-642

Chevrier, I (2007), Why do conclusions from the experts vary? In Wenger, A. and Wollenmann, R.. *Bioterrorism*: *Confronting a Complex Threat* (Boulder: Lynne Rienner Publishers). [E-book UCL library]

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5.   What is a weapon? How STS studies military and security technologies.

"I need a weapon," Valkyrie muttered.
"You're an Elemental with a Necromancer ring, trained in
a variety of martial arts by some of the best fighters in the world," Skulduggery pointed out. "I'm
fairly certain that makes you a weapon."
"I mean a weapon you hold. You have a gun, Tanith has a sword... I want a stick."
"I'll buy you a stick for Christmas."
— Derek Landy, *Mortal Coil*

Essential Reading

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]

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

Vogel, Kathleen *et al* (2017), "Knowledge and Security", in *The Handbook of Science and Technology Studies* 4th,, 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]

Social Shaping vs Technological Determinism

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.

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.

Actor-Network Theory and Assemblage Theory

Soeters, J (2018), *Sociology and Military Studies: Classical and Current Foundations* (London: Routledge), Chapter 14 (Bruno Latour: Science and Technology in Society and in the Military) (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* Vol 19 No 2: 199-215 https://ojs.library.queensu.ca/index.php/surveillance-and-society/article/view/14261

DeLanda, M (2016), *Assemblage Theory* (Edinburgh: Edinburgh University Press), Introduction and Chapter 3 (Assemblages and the Weapons of War) [UCL Library E-book]

Socio-Technical Imaginaries

Myers West, S. (2018). Cryptographic imaginaries and the networked public. *Internet Policy Review*, *7*(2).

Daniel R. McCarthy (2021) Imagining the security of innovation: technological innovation, national security, and the American way of life, *Critical Studies on Security*, 9:3, 196-211, DOI: 10.1080/21624887.2021.1934640
[Uses the STS perspective of socio-technical imaginaries]

van der Maarel, *et al* (2023). "This Is Not What I Signed up for": Sociotechnical Imaginaries, Expectations, and Disillusionment in a Dutch Military Innovation Hub. *Science, Technology, & Human Values*, 0(0). https://doi.org/10.1177/01622439231211032

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* (2nd Edition), 1999, Chapter 25. 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.)

6.   Tacit Knowledge: Can Weapons be Un-Invented?

*"I shall reconsider human knowledge by starting from the fact
that we can know more than we can tell."*
Michael Polanyi

Essential Reading

Dennis, MA (2013). "The Less Apparent Component. Tacit Knowledge as a Factor in the Proliferation of WMD: The Example of Nuclear Weapons." *Studies in Intelligence* 57 (3): 1–9.
Available at: https://www.hsdl.org/?abstract&did=800586

Additional Reading

Vogel, Kathleen M. (2008), 'Framing biosecurity: an alternative to the biotech revolution model?', *Science and Public Policy*, Volume 35, Number 1, February 2008 , pp. 45-54(10).

Schmidt, K (2012), 'The trouble with 'tacit knowledge'', *Computer Supported Cooperative Work* 21:163-225 [Not about security but one of the few critiques of 'tacit knowledge']

Lynch, M (2013), 'At the margins of tacit knowledge', *Philosophia Scientiæ: Studies in History of Sciences and Philosophy* 17(3) pp. 55-73

Revill, J. and Jefferson, C. (2013). 'Tacit knowledge and the biological weapons regime'. *Science and Public Policy*, 41(5), pp.597-610.

Ferhani, A. J. (2022) ''Yeah, this one will be a good one', or Tacit knowledge, prophylaxis and the border: Exploring everyday health security decision-making', *Security Dialogue*. doi: 10.1177/09670106211066750.

Nick Ritchie (2023) Irreversibility and Nuclear Disarmament: Unmaking Nuclear Weapon Complexes, *Journal for Peace and Nuclear Disarmament*, DOI: 10.1080/25751654.2023.2282737

Ouagrham-Gormley, S. (2012). 'Barriers to Bioweapons: Intangible Obstacles to Proliferation'. *International Security*, 36(4), pp.80-114.

Marris, C., Jefferson, C. and Lentzos, F. (2014). Negotiating the dynamics of uncomfortable knowledge: The case of dual use and synthetic biology. *BioSocieties*, 9(4), pp.393-420.

BWC Meeting of Experts (2015), Tacit knowledge: The concept and its implications for biological weapons proliferation (Geneva: United Nations) https://bit.ly/2HUNJKZ

Specifically on the 'uninvention of nuclear weapons' debate:

Donald MacKenzie and Graham Spinardi (1995), 'Tacit knowledge, weapons design, and the uninvention of nuclear weapons' *American Journal of Sociology* 101(1), pp.44-99. [a seminal STS discussion of 'tacit knowledge' and arms control]

Mike Bourne (2016) Invention and uninvention in nuclear weapons politics, *Critical Studies on Security*, 4:1, 6-23

Sims, B. (2007). "Revisiting the Uninvention Hypothesis: A Transactional View of Tacit Knowledge in Nuclear Weapons Design". http://public.lanl.gov/bsims/pdf/4S%20tacit%20knowledge.pdf

7.   Non-Knowledge: Secrecy, Ignorance and Absence

"What happened down in the dungeons between you and Professor Quirrell is a complete secret, so, naturally the whole school knows."
J. K. Rowling, *Harry Potter and the Philosopher's Stone*

Essential Reading

Paglen, T. (2010), 'Goatsucker: toward a spatial theory of state secrecy'. *Environment and Planning D: Society and Space*, 28(5), pp.759-771.

Additional Reading

Secrecy

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

Balmer, B (2012), *Secrecy and Science: A Historical Sociology of Biological and Chemical Warfare* (London: Routledge) (Chapter 1 for a review of literature on science and secrecy; Chapter 7 for VX nerve gas study). [UCL Library E-book]

Rappert, B (2012), *How To Look Good in a War: Justifying and Challenging State Violence,* London: Pluto.   Chapter 3: 'Disabling discourses: International Law, Legitimacy and the Politics of Balance' [UCL Library E-book]

Van Verren, E (2019), 'Secrecy's Subjects: Special Operators in the US Shadow War', *European Journal of International Security*, 4:386-414.

Masco, J. 2001. 'Lie detectors: of secrets and hypersecurity in Los Alamos'. *Public Culture*, 14(3), 441-67.

Ignorance

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

Griessl, L. The Power of Secret Knowledge: The RAND Corporation, Ignorance Studies and Sociology. *Am Soc* (2023). https://doi.org/10.1007/s12108-023-09567-2

Gould, L. and Stel, N. (2022) 'Strategic ignorance and the legitimation of remote warfare: The Hawija bombardments', *Security Dialogue*, 53(1), pp. 57–74. doi: 10.1177/09670106211038801.

Absence

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]

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

8. Automatic War

*Announcer: Remember, building robots is extremely dangerous
and should not be attempted without great care.*
Safety disclaimer at the end of each episode of TV programme *Robot Wars*

Essential Reading:

Sharkey, N., Suchman, L (2013), Wishful mnemonics and autonomous killing machines *Proceedings of the AISB.* 136, p. 14-22.
https://eprints.lancs.ac.uk/id/eprint/65657/1/Sharkey_Suchman_AISBQ_136.pdf

Additional Reading

POST (2015), Automation in Military Operations (HMG: POST)
https://researchbriefings.parliament.uk/ResearchBriefing/Summary/POST-PN-0511#fullreport

Lucy Suchman (2020) Algorithmic warfare and the reinvention of accuracy, *Critical Studies on Security*, 8:2, 175-187, DOI: 10.1080/21624887.2020.1760587

Suchman, L (2015) 'Situational Awareness: Deadly Bioconvergence At The Boundaries Of Bodies And Machines', *MediaTropes* eJournal Vol V, No 1 (2015): 1–24
https://mediatropes.com/index.php/Mediatropes/article/view/22126/17971

Van Rompaey, L. (2019). Shifting from Autonomous Weapons to Military Networks, *Journal of International Humanitarian Legal Studies*, *10*(1), 111-128. doi: https://doi.org/10.1163/18781527-01001011

Elvira Rosert & Frank Sauer (2021) How (not) to stop the killer robots: A comparative analysis of humanitarian disarmament campaign strategies, *Contemporary Security Policy*, 42:1, 4-29, DOI: 10.1080/13523260.2020.1771508

Chandler, K. (2022) 'Apartheid drone: Infrastructures of militarism and the hidden genealogies of the South African Seeker', *Social Studies of Science*. doi: 10.1177/03063127221105748. [Go to e-journal page and then Online First]

Gregory, D. (2011). From a View to a Kill: Drones and Late Modern War. *Theory, Culture & Society*, 28(7-8), 188-215. https://doi.org/10.1177/0263276411423027

Robert Paul Edwards (1994), *The Closed World: Computers and the Politics of Discourse in Cold War America*, Cambridge MA: MIT Press pp. 3-15. [UCL Library E-book]

Gusterson, H. (2014), "Toward an anthropology of drones." In M. Evangelista and H. Shue, eds., *The American Way of Bombing: Changing Ethical and Legal Norms from Flying Fortresses to Drones*. Cornell Univ. Press, pp. 191-206. [UCL Library E-book]
OR
Gusteron, H (2016), *Drone: Remote Control Warfare* (Cambridge Mass: MIT) [UCL Library E-book]

Suchman, *et al* (2017), 'Tracking and Targeting: Sociotechnologies of (In)security', *Science, Technology and Human Values* Volume: 42 issue: 6, page(s): 983-1002 (This is an introduction to a special edition, so you might want to read this first and other articles in the special edition that interest you).

Bode, I. (in press). Emergent Normativity: Communities of practice, technology, and lethal autonomous weapon systems. *Global Studies Quarterly*.
https://findresearcher.sdu.dk/ws/portalfiles/portal/224959580/Bode_Emergent_Normativitity_GSQ_2023.pdf
(On the significance between labelling weapons as either automated or autonomous)

Ethics (not STS but useful)

Sullins, P (2013), An Ethical Analysis of the Case for Robotic Weapons Arms Control, in 5th International Conference on Cyber Conflict K. Podins, J. Stinissen, M. Maybaum (Eds.)
https://ccdcoe.org/cycon/2013/proceedings/d2r1s9_sullins.pdf

Robert Sparrow (2009), 'Building a Better WarBot: Ethical Issues in the Design of Unmanned Systems for Military Applications', *Science and Engineering Ethics* 15(2), pp. 169-187

Irving Lachow (2017), 'The upside and downside of swarming drones', *Bulletin of the Atomic Scientists*, 73:2, 96-101

Simulation and Gaming

Payne, MT (2016), *Playing War: Military Video Games After 9/11* (New York: NYU Press). (especially Introduction: Welcome to Ludic War)

Ghamari-Tabrizi, S. (2000). Simulating the Unthinkable: Gaming Future War in the 1950s and 1960s. *Social Studies of Science*, 30(2), pp.163-223.

Crogan, P (2011), *Gameplay mode : war, simulation, and technoculture* (University of Minnesota Press). Intro, Chapter 1 (and 3) [UCL Library E-book]

Stahl, Roger (2009). *Militainment, Inc.: War, media, and popular culture*. London: Routledge.

(Chapter 1 and 4).   [UCL Library E-book]
You can also access a film based on the book, also called *Militainment, Inc*, through UCL library –
warning there are some scenes of war violence – the sections entitled Clean War and Techno-
fetishism (17 mins 30s to 41 mins) are the most relevant for this course.

I can supply a fuller reading list on the links between video gaming and war

Cybersecurity

Myriam Dunn Cavelty (2018), 'Cybersecurity Research Meets Science and Technology Studies',
Politics and Governance , Volume 6, Issue 2, Pages 22–30

Balzacq, T and Dunn Cavelty, M (2016), 'A theory of actor-network for cyber-security', *European
Journal of International Security* 1:176-198

Rid, T "Cyber War Will Not Take Place." *Journal of Strategic Studies* 35, no. 1 (February 2012): 5–32.
http://www.tandfonline.com/doi/pdf/10.1080/01402390.2011.608939?needAccess=true

Stone, J "Cyber War Will Take Place!" *Journal of Strategic Studies* 36, no. 1 (February 2013): 101–8.
https://doi.org/10.1080/01402390.2012.730485.

Dunn Cavelty, M., & Wenger, A. (Eds.). (2022). *Cyber Security Politics: Socio-Technological
Transformations and Political Fragmentation* (1st ed.). Routledge.
https://doi.org/10.4324/9781003110224 (Introduction)

9.   War Every Day: The Securitisation of Everyday Life

"And when they spy on us let them discover us loving"
Alice Walker, *Taking the Arrow Out of the Heart*

Essential Reading

Woolgar, S and Neyland, D (2014), 'Mundane terror', in Woolgar, S and Neyland, D, *Mundane Governance: Autonomy and Accountability* (Oxford: OUP) Chapter 8 [UCL Library E-book]

Additional Reading

Surveillance and everyday life:

Lyon, David, (2009) ' Surveillance, power, and everyday life', in Chrisanthi Avgerou et al (eds), *The Oxford Handbook of Information and Communication Technologies* (2009) pp 449–468.

Benjamin Goold, Ian Loader and Angélica Thumala (2013), 'The Banality Of Security: The Curious Case of Surveillance Cameras', *Brit. J. Criminol*. 53: 977–996 [Considers how some security technologies become normalized and others attract controversy]

Skinner, David (2020) 'Race, Racism and Identification in the Era of Technosecurity', *Science as Culture*, 29:1, 77-99.

Benjamin, Ruha (2016), 'Catching our Breath: Critical Race STS and the Carceral Imagination', *Engaging Science, Technology, and Society* 2 (2016), 145-156

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

Fussey, P, Davies, B, and Innes, M (2020) , 'Assisted' facial recognition and the reinvention of suspicion and discretion in digital policing, *The British Journal of Criminology*, Volume 61, Issue 2, March 2021, Pages 325–344, https://doi.org/10.1093/bjc/azaa068

Non-lethal weapons:

Rappert, B. (2001), 'Scenarios on the Future of Non-lethal Weapons', *Contemporary Security Policy* 22(1): 50-74.

Feigenbaum, A (2017), *Tear Gas: From the Battlefields of World War I to the Streets of Today* (London: Verso) Especially Chapter 5 (The Science of Making Tear Gas 'Safe')(Digitized chapter ordered for Moodle e-reading list).

Planning Ahead:

Cooper, M (2006), 'Preempting Emergence: The Biological Turn of the War on Terror', *Theory, Culture and Society*, Volume 23.4, July 2006, pp. 113-135.

Collier, S. (2008). Enacting catastrophe: preparedness, insurance, budgetary rationalization. *Economy and Society*, 37(2), pp.224-250.

Lakoff, A. (2007). Preparing for the Next Emergency. *Public Culture*, 19(2), pp.247-271.

Securitization:

Kelle, A (2007) 'The Securitization of International Public Health. Implications for Global Health Governance and the Biological Weapons Prohibition Regime', in *Global Governance*, Vol.13, No.2, pp.217-235.

Media, Culture and Military Technology.

Stahl, Roger (2009). *Militainment, Inc.: War, media, and popular culture*. London: Routledge. (Chapter 1).   [UCL Library E-book]
You can also access a film based on the book, also called *Militainment, Inc*, through UCL library – warning there are some scenes of war violence – the sections entitled Clean War and Techno-fetishism (17 mins 30s to 41 mins) are the most relevant for this course.

Wald, P (2008), *Contagious: Cultures, Carriers and the Outbreak Narrative* (Durham: Duke University Press) Chapter 4 (Viral Cultures: Microbes and Politics in the Cold War) – for links between viruses, Cold War politics and science fiction. [UCL Library E-book]

Lentzos, F. Gouyon, J. Balmer, B (2020), 'Imagining future biothreats The role of popular culture', in Wenger, A et al (eds),*The Politics and Science of Prevision: Governing and Probing the Future* (London: Taylor and Francis). Ch. 10.
https://www.taylorfrancis.com/books/e/9781003022428/chapters/10.4324/9781003022428-13

Monsees, L (2020) 'A war against truth' - understanding the fake news controversy, *Critical Studies on Security*, 8:2, 116-129.

Wagner, W., Viidalepp, A., Idoiaga-Mondragon, N., Talves, K., Lillemäe, E., Pekarev, J., & Otsus, M. (2023). Lay representations of artificial intelligence and autonomous military machines. *Public Understanding of Science*, 32(7), 926-943. https://doi.org/10.1177/09636625231167071

I can make a reading list on video games and the military available on request.

10. After War: Who Counts the Dead?

"Without individuals we see only numbers, a thousand dead, a hundred thousand dead, 'casualties may rise to a million.' With individual stories, the statistics become people- but even that is a lie, for the people continue to suffer in numbers that themselves are numbing and meaningless".
Neil Gaiman, *American Gods*

Essential Readings

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

Additional Reading

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

Best, Joel (2023). "Considering What Counts: Mass Shooting Math." *Numeracy* 16, Iss. 1 (2023): Article 8. DOI: https://doi.org/10.5038/1936-4660.16.1.1426

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) [E-book]

Stone, J (2007), 'Technology and the problem of civilian casualties in war', in Brian Rappert (ed.), *Technology and Security: Governing Threats in the New Millennium*, (Basingstoke: Palgrave Macmillan), pp.133-151 (Digitized on Moodle Reading List)

Gould, L. and Stel, N. (2022) 'Strategic ignorance and the legitimation of remote warfare: The Hawija bombardments', *Security Dialogue*, 53(1), pp. 57–74. doi: 10.1177/09670106211038801.

McCann, L. (2017) ''Killing is our business and business is good': The evolution of 'war managerialism' from body counts to counterinsurgency', *Organization*, 24(4), pp. 491–515.

Auchter, J (2016), 'Paying Attention to Dead Bodies: The Future of Security Studies?', *Journal of Global Security Studies*, Volume 1, Issue 1, Pages 36–50.

Krause, K. (2017). 'Bodies count: the politics and practices of war and violent death data'. *Human Remains and Violence: An Interdisciplinary Journal* 3, 1, 90-115, available from: <https://doi.org/10.7227/HRV.3.1.7>

Wellerstein, A (2020), 'Counting the Dead at Hiroshima and Nagasaki', *Bulletin of the Atomic Scientists* (4 August 2020) https://thebulletin.org/2020/08/counting-the-dead-at-hiroshima-and-nagasaki/

Sharkey, N., Suchman, L (2013), Wishful mnemonics and autonomous killing machines *Proceedings of the AISB.* 136, p. 14-22.
https://eprints.lancs.ac.uk/id/eprint/65657/1/Sharkey_Suchman_AISBQ_136.pdf

Stone, Deborah. 2020. *Counting: How We Use Numbers to Decide What Matters*. New York: Norton. (Not about war, but a readable popular account of the sociology and politics of counting)

Assessment

Both assessments should demonstrate engagement with some of the approaches and concepts from history, philosophy and/or social studies of science and technology covered in the module.

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

Long Essay: Assignment one

This assignment is designed as an in-depth engagement with a topic of your choice relevant to the module. It is designed to test general essay writing skills including critical thinking skills.

Your essay should be 2500 words (+/- 10%) long on a topic related to the course. (Don't count the title or bibliography) See below for the list of topics and themes we covered each week (excluding week 1). You can choose a whole topic, one or more particular aspects of a topic, or even answer a question that makes links across topics if you want. You can choose or modify the example question, but credit will be given to students who select their own question.

Essay Part 1: Preparation

Over reading week, you should do some preliminary reading and formulate a working essay question. This need be no more than the topic essential reading and perhaps one or two additional readings (but it's up to you).

Here is some essential advice on formulating a good essay question:

https://writingcenter.gmu.edu/guides/how-to-write-a-research-question

 Write down the question you intend to answer and briefly give the main reasons for your answers to the evaluation questions (Step 5 of the steps to developing a research question in the link above):
- *Is your research question clear?* With so much research available on any given topic, research questions must be as clear as possible in order to be effective in helping the writer direct his or her research.
- *Is your research question focused?* Research questions must be specific enough to be well covered in the space available.
- *Is your research question complex?* Research questions should not be answerable with a simple "yes" or "no" or by easily-found facts. They should, instead, require both research and analysis on the part of the writer. They often begin with "How" or "Why."

If you are having difficulty formulating a question read:
Elaine Payne and Lesley Whittaker, *Developing Essential Study Skills* (Chapter 15, especially the part on understanding what a question is asking you to do)

All essays ask a question, and in providing an answer you need to make an argument. Add a short sentence or two starting "I intend to argue that...." (what are you trying to persuade the reader in relation to the topic).   This is early planning, your wording of the question and the argument might change as you read more.

 Your maximum word count for this preliminary proposal should be 200 words. This will not be assessed - it is an opportunity to get some brief, early feedback on where you are headed with the assessment. Again, you can modify or even change your topic and argument based on feedback. Submit your evaluation and argument on Moodle.

Essay Part 2: Write your 2500 word essay.

TOPIC 1.
Scientist's responsibility in war.
Military experiments involving humans (what counts as an experiment?)

Example question: Are scientists responsible for the weapons they create?

TOPIC 2.
Role of scientists in atomic warfare
Disarmament – CND, Pugwash etc
Bureaucratisation of killing

Example question: Were Cold War scientists naïve to become involved in nuclear disarmament initiatives?

TOPIC 3.
Chemical and Biological Weapons
Arms control/disarmament

Example question: Are there better ways to think about the so-called dual-use dilemma than in terms of 'dual-use'?

TOPIC 4.
What is a weapon? Where do new military technologies come from?
Technological Determinism vs Social Shaping,
Actor-Network theory/Assemblage theory

Example question: How, if at all, are military technologies socially shaped? What, if any, are the limitations of the 'social shaping' approach?

TOPIC 5.
Tacit knowledge and military technology

Example question: Does 'tacit knowledge' present a serious barrier to the proliferation of Weapons of Mass Destruction?

TOPIC 6.
Non-knowledge and secrecy/absence/ignorance in military and security issues
Counting the dead, and the politics of counting the dead

Example question: Is secret military science simply open science done behind closed doors?

TOPIC 7.
Automatic war
Drones

Cybersecurity
Simulation and war (see also war and popular culture, topic 8)

Example questions: Critically discuss Sullin's contention that 'If you are a politician in a liberal democracy, then the technology of unmanned weapons is the answer to your dreams'.

Discuss whether it is possible to have "meaningful human control" over autonomous weapons.

TOPIC 8.
Securitisation of everyday life
Surveillance
Non-lethal weapons
Planning for the next emergency
War, science and popular culture (see also simulation, topic 8)

Example question: How do security technologies 'spread' into everyday life? Do these new security technologies make daily life more or less secure?

TOPIC 9.
Counting casualties
You might want to make links to impersonalisation of war (Topic 2)

Example question: "Mathematics is and are inseparable from politics" (Nelson 2015, p4). Critically discuss this claim in relation to counting casualties during and after war.

Short Review Essay: Assignment Two

By this stage of the module you should be able to read, understand and start to provide your own evaluation of research articles that draw on STS approaches when dealing with war and security. This assessement is designed as a cap-stone to the module, asking you to read a general overview of the field and then to select a single piece to review (with some contextual reading) – it will test your ability to write concisely and critically with a focus on a single piece of writing.

First read the chapter:

Vogel, Kathleen *et al* (2017), "Knowledge and Security", in *The Handbook of Science and Technology Studies* 4th,, edited by Ulrike Felt *et al*. Cambridge MA: MIT Press, 2017, Section V, 973-100.
[Available online through UCL Library and direct through the module Moodle site under Assessment]

Alternatively, if you are interested in the topics of misinformation, predictive policing or dual-use synthetic biology then you can use the bibliography in this (just published) article, instead or in addition to Vogel *et al*, to locate the piece you want to review.
Evans, S. W., Leese, M. and Rychnovská, D. (2021) 'Science, technology, security: Towards critical collaboration', *Social Studies of Science*, 51(2), pp. 189–213. doi: 10.1177/0306312720953515.

These are up to date reviews of the 'state of the art' of research in STS and security. Perhaps wait until at least week 2 (after the class) of the course to begin reading either.

Select **one** research article or chapter (or whole book if you're feeling ambitious) from the **chapter bibliography** at the end of the Vogel *et al* chapter on a topic that you are not intending to choose for your long essay.

Avoid any short news items or very descriptive background pieces as there will be less to agree or disagree with. You must make this a different topic to your essay one topic (you are permitted some overlap, but it should mainly link to a different topic).   Avoid articles/chapters which have been cited for general reasons but are not specifically related to the theme of the module (science, technology, war and security).

Write a 1000 (+/-10%) word critical review of the article/chapter/book.
- The review should have a title of your choosing, and you should also clearly state which piece you are reviewing. [don't add this to the word count nor the bibliography]
- *You should also read at least 3-4 pieces from the most relevant topic on the reading list or material cited in the Vogel or Evans chapters as contextual material. You can also search out your own contextual material.*
- The review should **describe** and **explain** the main argument(s) presented in the article/chapter/book. Your review should also leave space for **critical discussion** of the material presented in the piece (e.g. strengths, weaknesses, comparison with other literature on the topic, or with other approaches on the course, does it really achieve what it claims to have done?). Hint: It helps here to have one main message that runs through your review.
- Once you have cited your main review article/chapter/book for the first time, after that you can simply refer to the page number(s) in brackets instead of citing each time. Other citations to contextual reading should be fully cited (see standard referencing conventions such as Harvard or Chicago for in text and in bibliography formats).