Course information 2026-27

Emerging Technology and War: From Cyberwarfare to Killer Robots

General information

MODULE LEVEL: 6

CREDIT: 30

NOTIONAL STUDY TIME: 300 hours

MODE: Locally Taught and Independent Learner Route Only (not available for Online Taught students).

Summary

The proposed course uses an interdisciplinary approach rooted in political science, sociology, policy studies, strategic studies, history, science and technology studies, and international relations to introduce students to both the technical basics and regulatory, political, and ethical issues arising from various forms of emerging technology. Empirically, it focuses on modern warfare and investigates the challenges that new methods of conflict – from cyber operations and network-centric warfare to bioweapons – play in the landscape of international politics.

Conditions

Please refer to the relevant programme structure in the EMFSS Programme Regulations to check:

• where this course can be placed on your degree structure; and

• details of prerequisites and corequisites for this course.

You should also refer to the Exclusions list in the EMFSS Programme Regulations to check if any exclusions apply for this course.

Aims and objectives

This course has four main aims, and these directly relate to the major themes that will be emphasised throughout this subject guide. The course will enable students to:

- Understand the laws, norms, and theories of warfare;
- Be familiar with emerging technologies and their roles in modern warfare;
- Analyse scholarship on the conduct and strategy of conflict;
- Consider the ethical, social, and political implications of emerging tech in/for warfare

Learning outcomes

At the end of this course, and having completed the Essential Reading and activities, students should be able to:

- Demonstrate an understanding of the laws, norms, and theories of warfare in both historical and contemporary applications
- Discuss and assess scholarship on international security and technology
- Evaluate emerged and emerging technologies and analyze their effects on conflicts

Employability skills

Below are the three most relevant employability skills that students acquire by undertaking this course which can be conveyed to future prospective employers:

- Persuasion & Negotiation
- Decision-making
- Communication

Essential reading

This course will cover a wide variety of readings, across different disciplines and cases, from legal texts on "killer robots" to the politics of nuclear weapons to the history of chemical weapons use. Below are four texts that are broadly indicative of some of the themes, arguments, and approaches in this course:

- Roland, Alex. War and Technology: A Very Short Introduction. Oxford University Press, 2016.
- Schelling, Thomas. Arms and Influence. Yale University Press. 1966.
- Narang, Vipin, and Heather Williams. "Thermonuclear Twitter?" In The Fragile Balance of Terror: Deterrence in the New Nuclear Age, edited by Vipin Narang and Scott D. Sagan, 63–89. Cornell University Press, 2022.
- Johnson, James. "The AI-Cyber Nexus: Implications for military escalation, deterrence, and strategic stability." Journal of Cyber Policy 4, no. 3 (2019): 442-460.

Assessment

This course is assessed by a three-hour and fifteen-minute closed-book written examination.

Syllabus

Unit 1: Technology, Innovation and Military History

- Key Questions: When and how do military technologies evolve? How do militaries innovate?
- Indicative Readings:
  - Grissom, Adam. "The Future of Military Innovation Studies." Journal of Strategic Studies, vol. 29, no. 5, 2006, pp. 905–934.
  - Horowitz, Michael C., and Shira Pindyck. "What Is a Military Innovation and Why It Matters." Journal of Strategic Studies, 2022, pp. 1–30.

Unit 2: Theorising International Security

- Key Questions: What is international security? Why do states go to war? Why do states compete or cooperate? How do norms and identities shape behaviour?What explains patterns of war and peace
- Indicative Readings:
  - Jervis, Robert. "Cooperation Under the Security Dilemma." World Politics, vol. 30, no. 2, 1978, pp. 167–206.
  - Newman, Edward. "Human Security and Constructivism." International Studies Perspectives, vol. 2, no. 3, 2001, pp. 239–251

Unit 3: Laws of Armed Conflict and Military Ethics

- Key Questions: What laws and ethics regulate when and how states can fight against each other? Why do states agree to restrictions on the use of force? How effective are the laws and ethics of warfare?
- Indicative Readings:
  - Michael Walzer, *Just and Unjust Wars,* Chs. 1-2.
  - [Geneva Conventions](#) I, II, and IV.
  - *Military Ethics: What Everyone Needs to Know,* Ch. 1, 2, & 4.

Unit 4: Lethal and Non-Lethal Weapons
- Key Questions: What strategies do states use to fight each other? How has the technology for weapons evolved? What are the implications of non-lethal weapons for modern warfare?
- Indicative Readings:
  - Singer, Peter W. "The Ethics of Killer Applications: Why is it so hard to talk about morality when it comes to new military technology?" *Journal of Military Ethics* 9, no. 4 (2010): 299-312.
  - Evangelista, Matthew. "Is War Too Easy?" *Perspectives on Politics* 14, no. 1 (2016): 132-137.
  - Kaurin, Pauline. "With Fear and Trembling: An ethical framework for non-lethal weapons." *Journal of Military Ethics* 9, no. 1 (2010): 100-1

Unit 5: Nuclear Strategy and Nuclear War

- Key Questions: How do nuclear weapons shape modern politics? How do states "use" with nuclear weapons? What role do nuclear weapons play in crises? How effective is deterrence?
- Indicative Readings:
  - Schelling, Thomas. *Arms and Influence.* Yale University Press. 1966. Chapters 2-3.

Unit 6: Nuclear Proliferation

- Key Questions: How, when, and why do states acquire nuclear weapons? Is the spread of nuclear weapons stabilizing or destabilizing?
- Indicative Readings:
  - Sagan, Scott. "Why Do States Build Nuclear Weapons? Three models in search of a bomb." *International Security* 21, no. 3 (1997): 54-86. https://doi.org/10.1162/isec.21.3.54.

Unit 7: Nuclear Nonproliferation & Counterproliferation

- Key Questions: Why don't more states have nuclear weapons? How can more states be prevented from building nuclear weapons? How effective are attempts to stop the spread of nuclear weapons?
- Indicative Readings:
  - Fuhrmann, Matthew and Yonatan Lupu. "Do Arms Control Treaties Work? Assessing the Effectiveness of the Nuclear Nonproliferation Treaty." *International Studies Quarterly* 60, no. 3 (2016): 530-539. https://doi.org/10.1093/isq/sqw013.
  - Malfrid Braut-Hegghammer, "Revisiting Osirak: Preventive Attacks and Nuclear Proliferation Risks," *International Security* 36, No. 1 (2011): 101-132. https://doi.org/10.1162/isec_a_00046.

Unit 8: Emergence of Cyberwarfare

- Key Questions: How does deterrence work in cyberspace? How do states "fight" in cyberspace? What challenges does cyberspace pose to warfighting?
- Indicative Readings:
  - Allenby, Braden. "Are New Technologies Undermining the Laws of War?" *Bulletin of the Atomic Scientist*, vol. 70, no. 1, (2014): 21-31.
  - Erica D. Borghard and Shawn W. Lonergan, "Why Are There No Cyber Arms Control Agreements?" Council on Foreign Relations Blog Post, January 16, 2018. https://www.cfr.org/blog/why-are-there-no-cyber-arms-control-agreements.

Unit 9: Sovereignty, States, and Cyberwar

- Key Questions: What is cyberwarfare? What are states' doctrines for warfare in cyberspace? What international laws are applicable in cyberspace?
- Indicative Readings:
  - Harknett, R. J., and Max Smeets. "Cyber Campaigns and Strategic Outcomes." *Journal of Strategic Studies*, vol. 45, no. 4, 2022, pp. 534–567.
  - Rid, Thomas, and Ben Buchanan. "Attributing Cyber Attacks." *Journal of Strategic Studie*s, vol. 38, no. 1–2, 2015, pp. 4–37.

Unit 10: Cybercriminals, Hackers, and Human Rights

- Key Questions: How does the prominence of nonstate actors in cyberspace influence states' cyber strategies? How can we understand the role of hackers, hacktivists, and cybercriminals in the cyber domain?
- Indicative Readings:
  - Millar, Katharine, James Shires, and Tatiana Tropina. "Gender Equality, Cybersecurity, and Security Sector Governance", *Geneva Centre for the Democratic Control of the Armed Forces*.2022.

https://www.dcaf.ch/sites/default/files/publications/documents/Gender_Cybersecurity_report_Jan2023.pdf
- o Pleil, Helene. "New realities of conflict: the novel roles of non-state actors within the cyber sphere." *Journal of Cyber Policy* (2025): 1-17.

Unit 11: The Private Sector, Tech Industry, and International Security
- Key Questions: What is "the tech industry"? How do governments regulate technology? How does the global production and trade of technology operate?
- Indicative Readings:
  - o "The CHIPS Act Is About More Than Chips: Here's What's in It," Ana Swanson, *The New York Times,* February 28, 2023, https://www.nytimes.com/2023/02/28/business/economy/chips-act-childcare.html.
  - o Bradford, Anu. "The false choice between digital regulation and innovation." *Nw. UL Rev.* 119 (2024): 377.

Unit 12: Subversion, Disinformation, and International Security

- Key Questions: How does information intersect with national security? What are the strategic risks of social media and deepfakes? How can the risks of disinformation be addressed?
- Indicative Readings:
  - o Hedling, Elsa, and Hedvig Ördén. "Disinformation, deterrence and the politics of attribution." *International Affairs* vol. 101 no. 3, 2025, pp. 967-986.
  - o La Cour, Christina. "Theorising digital disinformation in international relations." *International Politics* 57.4 (2020): 704-723.

Unit 13: Disinformation, State Security, and Electoral Inference

- Key Questions: How can states balance security concerns with concerns about rights such as free speech? How do states use information technologies to influence political outcomes at home and abroad? How does technology affect regime security?
- Indicative Readings:
  - o Bradshaw, Samantha, and Philip N. Howard. "The global organization of social media disinformation campaigns." *Journal of International Affairs* 71.1.5 (2018): 23-32.
  - o Levin, Dov. 2020. "How to Manage the Threat of Foreign Election Interference." *War on the Rocks.* https://warontherocks.com/2020/10/how-to-manage-the-threat-of-foreign-election-interference/.

Unit 14: Biosecurity

- Key Questions: What are the "best practices" and principles of biosecurity? How serious of a threat are bioweapons? How can bioweapons threats be reduced? In what ways are biosecurity threats similar or dissimilar to other weapons of mass destruction or other emerging threats?
- Indicative Readings:
  - o National Academy of Sciences, Engineering and Medicine. Biodefense in an Age of Synthetic Biology. 2018. Report Brief, https://www.nap.edu/read/24890/chapter/2.
  - o Palmer M., Fukuyama,F., and D. Relman A More Systematic Approach to Biological Risks. *Science*. 2015. http://science.sciencemag.org/content/350/6267/1471.

Unit 15: Drone Warfare and Precision-Strike Technology

- Key Questions: How has the use of drones changed warfare? Is the use of drones legal? Is it effective? What are the emerging challenges with the use of drones? Can commercial drones be used for military purposes? How has the prominence of drone warfare in the Russo-Ukrainian war changed strategic thinking about drones?
- Indicative Readings:
    o Walzer, Michael. "Just and Unjust Targeted Killing & Drone Warfare." *Daedalus* (Fall 2016): 12-24.
    o Shah, Aqil. "Do US Drone Strikes Cause Blowback? Evidence from Pakistan and Beyond." *International Security*, vol. 42, no. 4 (Spring 2018): 47-84.
    o Kreps, Sarah and Geoffrey Wallace. "International law, military effectiveness, and public support for drone strikes." *Journal of Peace Research* 9, no. 2 (2016): 1-9. https://doi.org/10.1177/20531680221093433.

Unit 16: "Killer Robots": Autonomous Weapons & AI Targeting

- Key Questions: To what extent is AI already used in military technology? How will developments in AI change modern warfare? What are the risks and challenges of AI for military technology? How will AI evolve over the long-term?
- Indicative Readings:
    o "Who is Winning the AI Race"? *Foreign Policy.* https://foreignpolicy.com/2023/03/27/us-china-ai-competition-cooperation/.
    o Johnson, James. "The AI-cyber nexus: implications for military escalation, deterrence and strategic stability." *Journal of Cyber Policy* 4, no. 3 (2019): 442-460.
    o Congressional Research Service, "Artificial Intelligence and National Security." Read the most recent report. You can find the reports here: https://crsreports.congress.gov/product/details?prodcode=R45178.
    o Horowitz, Michael. "The Ethics & Morality of Robotic Warfare: Assessing the Debate over Autonomous Weapons." *Daedalus* (Fall 2016): 25-36.

Unit 17: Gender, Race, Technology, and Insecurity
- Key Questions: Does technology elevate humanity or dehumanize? How might technology have differential effects on people of different genders and races? How can gender and race politics help us understand the development and implications of emerging military technologies?
- Indicative Readings:
    o Cohn, Carol. "Sex and Death in the Rational World of Defense Intellectuals." *Signs: Journal of Women in Culture and Society*, vol. 12, no. 4, 1987, pp. 687–718.
    o Fussell, Sidney. "How Surveillance Reinforced Racism." *Wired*, 19 June 2020, https://www.wired.com/story/how-surveillance-reinforced-racism/.

Unit 18: C4ISR and Space Technology
- Key Questions: What role do communications and information play in conflict? How does space enable C4ISR? Is space technology military technology? How is space technology regulated?
- Indicative Readings:
    o Ashton Carter, "Current and Future Military Uses of Space." Annals of the New York Academy of Sciences, vol. 489. no. 1. (1986): 5-17. https://www.belfercenter.org/sites/default/files/files/publication/CARTER-1986-Annals_of_the_New_York_Academy_of_Sciences.pdf.

- Air and Command Staff College, Space Primer, Air University Press, 2009, http://www.au.af.mil/au/awc/space/primer/. Chs. 13-17. (Note: Pay attention to basic concepts, but you don't need to know the specifics of different systems.)

Unit 19: Spies and Lies: Espionage

- Key Questions: What is the role of secrecy in national security? How do states conduct intelligence operations? How have emerging technologies transformed existing espionage practices?
- Indicative Readings:
  - Lin-Greenberg, Erik, and Theo Milonopoulos. "Private Eyes in the Sky: Emerging Technology and the Political Consequences of Eroding Government Secrecy." *Journal of Conflict Resolution*, vol. 65, no. 6, 2021, pp. 1067–1097.
  - Zegart, Amy, and Michael Morell. "Spies, Lies, and Algorithms: Why US Intelligence Agencies Must Adapt or Fail." *Foreign Affairs*, vol. 98, 2019, p. 85.