Title of the course:	21st Century Warfare: How New Technologies from Drones to Artificial Intelligence Are Shaping Human Conflict		
Course ID:	VE-NPT036		
Level of education:	Erasmus	Academic semester:	Spring
Professor's name:	Dr. Gábor Nyáry	Academic title:	
Hours per semester:	26	Credits:	4
Exam:	oral exam	Pre-requisites:	-

Aims of the course

The course aims to provide students with a comprehensive understanding of how emerging technologies—such as drones, cyber weapons, outer space assets, artificial intelligence (AI), and autonomous systems—are transforming the nature of warfare in the 21st century. Students will explore the ethical, strategic, and operational implications of these technologies, analyze case studies of modern conflicts, and critically assess their impact on global security. By the end of the course, students will be able to evaluate the role of technology in contemporary warfare, engage in informed debates about its future, and apply practical tools like large language models (LLMs) to analyze conflict scenarios.

Course outline

1. Introduction to 21st Century Warfare: Defining modern conflict and the role of technology.
2. The Evolution of Warfare: From conventional to asymmetric and hybrid warfare.
3. Drones and Unmanned Systems: Tactics, ethics, and case studies (e.g., Ukraine, Syria).
4. Cyber Warfare: State and non-state actors, cyberattacks, and defense strategies.
5. Artificial Intelligence in Warfare: Autonomous weapons, decision-making, and AI ethics.
6. The Role of Big Data and Surveillance: Intelligence gathering and privacy concerns.
7. Space as a New Battleground: Satellite warfare and space militarization.
8. Biotechnology and Human Enhancement: Biohacking, soldier enhancement, and ethical dilemmas.
9. Information Warfare and Disinformation: Social media, propaganda, and cognitive warfare.
10. Autonomous Weapons Systems: Legal, ethical, and operational challenges.
11. The Ethics of AI and Robotics in Warfare: Accountability and the laws of war.
12. Private Military Companies (PMCs) and Tech: The privatization of warfare.
13. Global Power Shifts: How technology is reshaping the balance of power.
14. Future Trends in Warfare: Quantum computing, hypersonic weapons, and beyond.
15. Fuzzy Boundaries: the hybrid threat landscape of outer space, cyber, and AI.

Practical works

1. Simulation Exercises: Use LLMs to simulate conflict scenarios and predict outcomes.
2. Board Gaming and Wargaming: Basic strategic game design and development.
3. Cyber Attack Simulation: Hands-on exercise in a controlled environment.
4. AI Ethics Debate: Role-playing as policymakers, military leaders, and ethicists.
5. Case Study Analysis: Group presentations on modern conflicts (e.g., Ukraine, Commercial sea lines and undersea cables).
6. Disinformation Campaign Design: Create and analyze a mock social media campaign.

Requirements and assessment

-   Class Participation (10%): Active engagement in discussions and practical exercises.
-   Group Project (25%): Simulation or presentation on a chosen topic.
-   Midterm Essay (25%): 3,000-word essay on a recommended or approved topic.
-   Final Exam (40%): Comprehensive test covering course material.

Recommended topics for essays:

1. The ethical implications of autonomous drones in modern warfare.
2. How AI is reshaping intelligence gathering and decision-making in conflicts.
3. The role of social media in information warfare: Case studies from Ukraine and beyond.
4. Cyber warfare as a tool for state and non-state actors: A comparative analysis.
5. The militarization of space: Opportunities and risks for global security.
6. The impact of private military companies on the future of warfare.
7. Human enhancement technologies: Ethical and operational challenges for militaries.
8. The role of AI in predicting and preventing conflicts.
9. The legal and moral accountability of autonomous weapons systems.
10. How emerging technologies are shifting the balance of power in global conflicts.

Grades:

- A: 90-100%
- B: 80-89%
- C: 70-79%
- D: 60-69%
- F: Below 60%

Readings

1. **Primary Textbook**:
   o Singer, P. W. *Wired for War: The Robotics Revolution and Conflict in the 21st Century*. 2009
2. **Additional Readings**:
   o Arquilla, J., & Ronfeldt, D. *Networks and Netwars: The Future of Terror, Crime, and Militancy*. 2001
   o Kaldor, M. *New and Old Wars: Organized Violence in a Global Era*. 1999
   o Rid, T. *Cyber War Will Not Take Place*. 2013
   o Roumate, Fatima: *Artificial Intelligence and the New World Order. New Weapons, New Wars and a New Balance of Power*. 2024
   o Scharre, P. *Army of None: Autonomous Weapons and the Future of War*. 2018
   o Smith, B. - Browne, C.: *Tools and Weapons: The Promise and the Peril of the Digital Age*. 2019
   o Taddeo, Mariarosaria: *The Ethics of Artificial Intelligence in Defence*. 2025
3. **Journal Articles and Reports**:
   o Colin, Ijebor: Artificially Intelligent Warfare and the Revolution in Military Affairs. *University of Manitoba*, 2020
   o Cummings, M.L.: Artificial Intelligence and the Future of Warfare. *Chatham House*, 2017
   o Gat, Atar: Is the decline of war a delusion? The long peace phenomenon and the modernization peace – the explanation that refutes or subsumes all others. *Journal of Strategic Studies*. 2024
   o Górnikiewicz, M.: Wars in the later 21st century. Forecast developments in the methods of warfare. *Security and Defence Quarterly*. 2019
   o Hom, Andrew R.: Wartime in the 21st century. *International Relations*. 2022
   o Lentzos, F.: How to protect the world from ultra-targeted biological weapons. *Bulletin of the Atomic Scientist*. 2020
   o Schulzke, M.: Twenty-first century military innovation: technological, organizational, and ethical dimensions of drone warfare. *International Affairs*. 2023
   o Weber, Jutta: Keep Adding. On Kill Lists, Drone Warfare and the Politics of Databases. *Environment and Planning D: Society and Space*. 2015
4. **Online Resources**:
   o LLM tools and platforms (partly, or entirely open-source) wargaming a modeling (e.g., OpenAI, Hugging Face – Llama, Mistral, DeepSeek, Qwen, Claude).