Artificial Intelligence and Policy Problems  
IAFF 6158

Note: This class previously was called: “Artificial Intelligence and Non-Proliferation.” The title (and the content) has been broadened to reflect the assessment of previous classes that a broader set of policy tools – not merely non-proliferation tools – needs to be considered to manage public policy problems created by Artificial Intelligence. The class still looks at classic non-proliferation tools but also at other types of policy tools as well.

International Science and Technology Policy  
Elliott School of International Affairs  
George Washington University

Instructor: Dr. Carol Kuntz  
Semester: Fall 2021  
E-mail: ckuntz28@gwu.edu  
Office Hours: tbd and by appointment  
Class Meeting Time: Wednesday, 5:10 to 7:00 pm  
Class Meeting: Monroe Hall 114  
Syllabus Version: Final (7-29-21)

Course Description

Artificial intelligence is a transformative technology whose application often creates new and acute public policy problems amidst the many benefits it provides. This class will study artificial intelligence and three of its applications – purposeful genomic manipulation, AI-enabled military capabilities, and facial recognition and the surveillance state. It will focus particularly on seeking promising strategies to manage the public policy problems that AI and its applications create. The class will examine at a general level how artificial intelligence works and how it can go wrong due to, for example, the poor quality or limited availability of data sets used to train the machine learning algorithms. The class will examine strategies used to manage similar public policy problems in the past and identify these strategies’ core mechanisms and enabling conditions. It will consider whether these classic strategies could be effective at managing a public policy problem caused by Artificial Intelligence. The class also will consider whether broader changes in the strategic environment – particularly the rise of China – undercut the utility of these classic strategies.

Learning Outcomes

• Students will learn at a general level how artificial intelligence works.  
• Students will learn about policy issues inherent in artificial intelligence and three critical applications – purposeful genomic manipulation, AI-enabled military capabilities, and facial recognition and the surveillance state.
• Students will learn about public policy strategies to manage similar problems and identify their core mechanisms as well as the enabling conditions that contributed to their success.
• Students will consider whether there are fundamental changes underway in the strategic environment – particularly the rise of China – and whether these changes undercut the utility of these classic strategies.

Required Books

The following books should be purchased.


Class Schedule and Assigned Readings

Week One – Wednesday, September 1

Topics:

(1) Overview of Class Objectives and Syllabus
(2) Overview of Artificial Intelligence

Readings: None

Week Two – Wednesday, September 8

Topics: Artificial Intelligence

(1) Lecture on Artificial Intelligence
(2) Discussion

Readings:


**Week Three – Wednesday, September 15**

Topic: Artificial Intelligence

(1) Lecture on Artificial Intelligence
(2) Discussion

Readings:


**Week Four – Wednesday, September 22**

Topic: Strategic Environment -- State Objectives

(1) (Short) Lecture on State Objectives: Classic Liberalism versus Nationalism
(2) Discussion

Readings:


**AI Explanation Paper due Friday, September 24**

**Week Five – Wednesday, September 29**
Topic: Purposeful Genomic Manipulation

(1) Lecture on Purposeful Manipulation of Genomes
(2) Lecture on how Machine Learning informs purposeful Manipulation of Genomes

Readings:


• Tiffany Duong, “There’s a New Fork in Town and It’s Biodegradable and Available at Target,” EcoWatch, April 30, 2021.

Optional Readings:


• Look at the website of the Broad Institute of MIT and Harvard (note that “Broad” as used here rhymes with “road” not “rod”) (Broadscience.org)

• Look at the IGEM, the International Genetically Engineered Machine Competition, website (igem.org). Review the standard registry of biological parts.

Week Six – Wednesday, October 6

Post One-Pager on Possible Strategies on Sunday, Oct 3 and provide two comments by Tuesday, Oct 5. Comments should speculate about usefulness of strategy for AI

Topic: Purposeful Genomic Manipulation – Lulu and Nana, CRISPR twins

(1) Discussion about Lulu and Nana
(2) Discussion of Candidate Strategies (One-pagers)

Readings:

• Doudna and Sternberg, A Crack in Creation, Pages 185-246.


• Antonio Regalado, “China’s CRISPR babies: Read exclusive excerpts from the unseen original research,” MIT Technology Review, Dec 3, 2019.

Candidates for Possible Strategy One-Pagers

• Nuclear Non-Proliferation Treaty (NPT)
• United Nations Security Council Resolution 1540 (UNSCR 1540)
• Ottawa Treaty (Prohibition of Landmines)
• World Institute of Nuclear Security (WINS)
• Proliferation Security Initiative (PSI)

Week Seven – Wednesday, October 13

Topic: AI Enabled Military Capabilities: Managing Escalation Risks and Deterrence Risks

(1) Discussion of Escalation Risks and Deterrence Risks
(2) Discussion of Tactical Applications of AI

Readings:

Escalation and Deterrence Risks


Tactical Applications of AI

• Elliot Ackerman, "A Navy SEAL, A Quadcopter, and a Quest to Save Lives in Combat," Wired, 10.30.2020

Week Eight – Wednesday, October 20

One-pagers on possible strategies are due on Sunday, October 17. Two comments are due on Tuesday, October 19. Comments should speculate on the utility of the strategy to manage AI.

Topic: AI Enabled Military Capabilities:

(1) Sources of Innovation
(2) Discussion of candidate strategies

Readings:

Candidates for Strategy One-Pagers

Innovation in Peacetime Militaries


Arms Control and Norm Creation

• Biological Weapons Convention
• Chemical Weapons Convention
• Strategic Nuclear Weapons agreements (SALT, START)
• Export Controls

Week Nine – Wednesday, October 27
Student presentation in class on October 27

Topic: Artificial Intelligence -- Vulnerability of AI to Bias

(1) Discussion on AI and Bias
(2) Pro/Con student debate on ProPublica /Washington Post articles

Readings:


- Julia Angwin, Jeff Larson, Surya Mattu and Lauren Kirchner, “Machine Bias: There’s software used across the country to predict future criminals. And it’s biased against blacks.” ProPublica, May 23, 2016.

- Sam Corbett-Davies, Emma Pierson, Avi Feller and Sharad Goel, “A computer program used for bail and sentencing decisions was labeled biased against blacks. It’s actually not that clear.” The Washington Post, October 17, 2016.


Student presentations: Students will be divided into groups for presentations.
Week Ten – Wednesday, November 3

One-pager on possible strategies posted on Sunday, October 31 and two comments posted by Tuesday, November 2. Comments should speculate on the utility of the strategy to manage AI problems.


(1) Discussion of data policy in the United States and its implications.
(2) Discuss one-pagers on candidate strategies

Readings:


Candidates for Strategy One-Pagers

• Strategic Litigation (Brown versus Board of Education)
• Dodd-Frank Wall Street Reform and Consumer Protection Act (2010)
• California Consumer Privacy Act (2018)
• Fair Labor Association Workplace Code of Conduct
• Preemption and Private Right of Action (current negotiations in Congress)

Week Eleven – Wednesday, November 10

Topic: Facial Recognition Technology and the Surveillance State

(1) Discussion on the European Union and the GDPR
(2) Discussion on China and “social capital”

Readings:


  [www.jstor.org/stable/j.ctvq4c0ft.8](http://www.jstor.org/stable/j.ctvq4c0ft.8).

**Week Twelve – Wednesday, November 17**

**Topic: Strategies**

1) Discussion on strategies to manage public policy problems created by AI

**Readings:**


AI Policy Problem Paper due on Monday, November 22.

Wednesday, November 24 – NO CLASS

Week Thirteen – Wednesday, December 8 (LAST CLASS)

Post Semester Paper Outline on Sunday, December 5 and comment on at least two classmates’ outlines by Tuesday, May 7

1. Class discussion

Semester Paper Due – Friday, December 17
CLASS POLICIES

Grading

Your grade will be calculated as outlined below:

<table>
<thead>
<tr>
<th>ASSIGNMENT</th>
<th>PERCENT OF FINAL GRADE</th>
<th>SEE SYLLABUS PAGE</th>
<th>DUE DATE</th>
<th>PAGE LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class participation</td>
<td>15</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
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<tr>
<td>Three One-Pagers on candidate strategies</td>
<td>15</td>
<td>Post one-pager on Sunday, Oct 3, Oct 17, and Oct 31; Post two comments by Tuesday, Oct 5, 19, and Nov 2</td>
<td>One-page each</td>
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<tr>
<td>Class Presentations</td>
<td>10</td>
<td>In class on October 27</td>
<td>n/a</td>
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<tr>
<td>AI Explanation Paper</td>
<td>15</td>
<td>Sunday, Sep 24</td>
<td>4 pages</td>
<td></td>
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<tr>
<td>AI Policy Problem Paper</td>
<td>15</td>
<td>Monday, Nov 22</td>
<td>5 pages</td>
<td></td>
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<tr>
<td>Semester Paper Proposal and Comments</td>
<td>5</td>
<td>Proposal posted by Sunday, December 5; two comments by Tuesday, December 7</td>
<td>1-2 pages</td>
<td></td>
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<tr>
<td>Semester Paper</td>
<td>25</td>
<td>Friday, December 17</td>
<td>10-12 pages</td>
<td></td>
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Class Reading and Participation

Students need to do the reading and actively engage with the ideas through participating in class discussions. Every student should expect to share a question, comment, or observation for each class meeting with discussion. The professor will keep notes about a student’s participation to inform this grade.
Each student needs to communicate in advance with the professor about planned absences or late arrivals from class sessions. Unexcused absences or late arrivals will count against your class participation grade.

In one of several efforts to build a sense of community, every student must schedule a 20-minute discussion in the first three weeks of the class with the professor for an informal discussion about your objectives for the class and your academic background.

Check the announcements page weekly for the plans for the class that week and participation expectations.

Overview of One-Pagers

The objective of the one-pagers is to build knowledge of various strategies that managed similar public policy problems.

Note that this work will lay the groundwork for your semester paper: the semester paper will require you to select an AI problem and a strategy and evaluate the strengths and weaknesses of using the strategy to manage the AI problem.

The process for one-pagers is as follows:

1. Sign up for an article (or topic) describing a particular strategy in the Discussion Board
2. Find and review a relevant academic article (Look at the appendix attached to the syllabus for suggestions for articles on most of the topics.)
3. Draft a one-pager using the following outline:
   - Background Paragraph describing the strategy
   - Core Mechanism of the strategy
   - Enabling Conditions for the success of the strategy
   - Initial thoughts on utility of strategy for managing public policy problems created by AI – what are important similarities and dissimilarities?

4. Post one-pager in the discussion board by Monday before class
5. Comment on two classmate’s papers by Tuesday before class
6. Actively participate in discussion on candidate strategies in class on Wednesday

There will be an hour of class devoted to discussing the one-pagers. One-pagers should be single-spaced, 12 point font.

Definitions:

The Core Mechanism is a short description, in general terms, of how the tactic or strategy worked. For example, the core mechanism of the Nuclear Non-Proliferation Treaty could be that technologically advanced states agreed to provide dual use technology to less-advanced countries in exchange for the receiving countries agreeing
to inspections to assure they are not diverting the technology from civilian to military purposes.

**Enabling Conditions** make possible the effectiveness of the tactic or strategy. They could include, for example, characteristics of the technology (for example, low entry costs or significant differences between military or civilian use of the technology); of the organization (military organizations have cultural prohibitions against innovation); or of the strategic environment (for example, agreement about the shared security threat or the presence of the U.S. security umbrella).

**Overview of Papers**

All papers should be submitted electronically in the appropriate folder on Blackboard by the end of the date specified in the syllabus. All papers should be double-spaced and in 12-point font.

Extensions must be requested and approved in e-mail prior to the due date of the paper. There is a presumption that requests for an additional 48 hours will be approved but please request the 48 hours before the original due date and time.

Your papers should be written in proper English and without grammatical errors. Please avoid technical jargon. All work should be original and new. Sources should be properly cited.

Please be aware that I look for a very clean and clear argument and structure when grading papers. Have a clear thesis statement for the paper and consider having various signposts as we move through your argument (section headings or clear introductory sentences). Have a conclusion that reflects the argument. Consider having one or two sentences that step-away from your argument and speculate on the broader implications of your findings.

**AI Explanation Memo**

The AI Explanation Memo is due on Blackboard on Friday, September 24. It should be four double-spaced pages using 12-point font for the text.

The objective of this paper is to demonstrate that you understand basic concepts of Artificial Intelligence and can explain them to a layperson. After explaining them, discuss some of the potential sources of problems with AI.

**AI Policy Problem Paper**

The second paper is due on Blackboard on Monday, November 22. It should be five pages.

The objective of this paper is to demonstrate that you can identify a public policy problem caused or worsened by AI and explain how the characteristics of AI had this
effect. You should select a problem within one of the broad categories we have studied in class:

• Purposeful Genomic Manipulation
• AI-Enabled Military Capabilities
• Vulnerability of AI to Bias
• Facial Recognition and the Surveillance State

Explain as precisely as possible how Artificial Intelligence created or worsened this problem. Also discuss other factors contributing to this problem. You may wish to speculate about a solution.

Semester Paper Proposal

The Semester Paper Proposal (1-2 pages) should be posted on Sunday, December 5. Each student is expected to comment on two students’ proposals by Tuesday, December 7.

Semester Paper

Turn in 10 to 12-page semester paper on Friday, December 17.

The semester paper should have the following components:

1. Statement of Problem (Public policy problem created or worsened by AI)
2. Strategy you are going to evaluate as a possible solution
3. How did AI cause or worsen this problem?
   1. Explain as precisely as possible how Artificial Intelligence created or worsened this problem. Please demonstrate an understanding of some of the high-level implications of the AI concepts we discussed.
4. Are there other factors that created or worsened this problem?
5. Discussion of Candidate Strategy.
   1. Outline the strategy’s core mechanism and enabling conditions.
   2. Consider whether the core mechanism would work if applied to your AI problem.
   3. Would the enabling conditions be present?
   4. What are the principal similarities and differences between the historical problem and the AI problem?
6. Conclusion about whether the strategy is a worthy effort on your AI problem
7. Step away and make some broader observations about public policy implications of AI
Appendix: Sources for Candidate Strategies for Managing AI

Here are some articles and book chapters that I have found to be useful in understanding the candidate strategies. You are not limited to these sources, and, for the domestic strategies, there are not sources listed. Please use good judgement when selecting sources of your own and provide complete citations. Wikipedia, for example, would not be considered an appropriate source.

**Nuclear Non-Proliferation Treaty (and Atoms for Peace)**


**Chemical Weapons Convention**


**Biological Weapons Convention**


**Ottawa Treaty (Landmines)**


**Strategic Nuclear Weapons**


**World Institute of Nuclear Security**
• Review the website for the World Institute of Nuclear Security, (www.wins.org). What is the organization’s objective? How should WINS judge success? Do you assess that they are successful?

Export Controls


UNSCR 1540 -- International Goal; National Implementation

• Peter Van Ham and Olivia Bosch, Global Non-Proliferation and Counter-Terrorism: The Impact of UNSCR 1540, Brookings Institution Press, 2007, Chapter: “Global Non-Proliferation and Counter-Terrorism: The Role of Resolution 1540 and its Implications,” pages 1 – 23.


Peacetime Military Innovation


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