DRAFT SYLLABUS
POGO 750 DISRUPTIVE TECHNOLOGY AND NATIONAL SECURITY

Professor: Craig J. Wiener, Ph.D.
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Office: Room 656. Office hours 6:00-7:00 PM Monday Evenings or by appointment.

COURSE DESCRIPTION:

Technological development, no matter its source, will continue to determine the future global balance of economic and strategic power. The purpose of this course is to provide International Security students an overview of various disruptive technologies being incorporated into US national security posture, how these technologies work and attain an understanding of how other nations are calculating responses to these technologies. The course will take a multidisciplinary approach to so called Third Offset technology dynamics, focusing on sources and manifestations of threat, operations & impacts, as well as solution strategies – in technical, economic, political and strategic terms. The course content will consist of a mixture of lectures provided by the professor, a small cadre of guest speakers, “Socratic” interactive classroom discussions, as well as student led briefings and policy recommendations resulting in the creation of strong professional research and writing samples that should help prepare a master’s student for a career as an analyst. Students will be responsible for integrating this information to formulate assessments of the course content as part of this process.

COURSE OBJECTIVES/STUDENT LEARNING OUTCOMES:

1. Familiarity and demonstrable baseline technical understanding of each of the main technologies or system of systems presented in the syllabus.

2. Develop a deep understanding of at least one advanced, emerging or asymmetric technology or basket of technologies as a result of this course.

3. Ability to critically analyze and evaluate current and evolving strategies for developing and integrating these technologies successfully into US National Security Posture.

4. Ability to critically analyze and evaluate adoption or countering strategies being developed by US or international competitors (depending on the technology or use case).
5. Arrive at a net assessment of what the US must do to maintain its military and competitive technological advantage in light of the course material from a strategic policy, investment and human capital perspective informed by the financial realities of current budgetary deficits.

**COURSE REQUIREMENTS:**

**Books:**


Optional reading list


Singer, Peter W. and Cole, August. Ghost Fleet: A Novel of the Next World War

**Additional Readings:**

All course materials (unless indicated otherwise), aside from the books recommended for purchase, appear as part of the course schedule below and are available via hyperlink. The professor will work with the students on the pace of the readings given the pace of discussion and instruction in the classroom. Given the dynamic nature of this subject, additional readings may be assigned or substituted for during the semester.

**Attendance Participation and Expectations:**

Attendance at all classes is required. Students are expected to finish the assigned readings before coming to class, be prepared to discuss the preparatory material, and actively participate in discussions. Student participation in class discussions will have a substantive impact on final course grades. Participation will be evaluated in terms of contributions to class discussion. Students are not expected to have an extensive background in advanced science and technology however it is expected that by the end of the course each student will have a reasonably deep understanding of their research topic at a graduate level of facility. Students are expected to share their thoughts and insights with the class. *Those students with direct professional and related knowledge of these subjects are especially encouraged to participate actively in discussion.*

**Statement on special needs of students (aka: reasonable standard accommodation language):**
If you are a student with a disability and you need academic accommodations, please see me and contact the Disability Resource Center (DRC) at 993-2474. All academic accommodations must be arranged through the DRC.

**Deliverables:**

1. A 15-20 minute briefing to the class on your topic of choice related to the course subject matter, including background to the issue, planned research and analytic approach/methodology and outline. (20%) **Delivered Week 3/ Week 4.** A sign-up sheet will be circulated on the first day of class with topical areas, which can be refined in further discussion with the professor after the first class.

2. 10 page research paper based on the above (40%) **Delivered Week 12**

3. 2-3 page action memo distilling the research question, background to the issue and national security technology relevance, state of play, advantages, disadvantages, three possible courses of action, including affirmative recommendations for funding based on open source analysis of current and out year budget and brief analysis of alternatives (25%) **Delivered Week 13/14**

4. Class Participation and attendance (15%)

Late Work: The deadlines for the deliverables are strict and extensions will not be permitted in the absence of a genuine emergency or documented illness. A late submission will be penalized a full letter grade (for example, from A to B) for every 24-hour period that it is late. Format and file naming nomenclature for submission will be provided. Deliverables are due no later than 7:20 pm on the day of class as delineated in the syllabus.

**Statement on academic integrity:**

Faculty in the Schar School have zero tolerance for academic dishonesty and will strictly enforce Mason’s honor code.
COURSE SCHEDULE:

Course Schedule: The course will be taught during the Spring 2019 semester running from Monday, January 22, 2019 through May 14, 2019

Course Block 1 Threat Picture and the Newest Major Military Innovation

Week 1: Overview of the International Threat Environment- What’s Going On Out There?

Week 2 The Rise of The Machines; Penetrate, Exploit, Disrupt, Destroy…

Week 3 Cyberology – What does the future hold?

Week 4 Proposal Briefings

Week 5 Proposal Briefings

Course Block 2 What’s The Next Major Military Innovation?

Week 6 Neuromorphic computing, deep learning and “big data”

Week 7 Supercomputing: National Strategic Computing Initiative (NSCI) What is Exascale and why do we care?; Quantum Computing

Week 8 Drones, Robotics and Autonomous Systems

Week 9 Autonomy and Robotics in warfare – Where do we go from here?

Course Block 3 Countering

Week 10 Missile Proliferation - Hypersonic Missiles/Vehicles

Week 11 Space Based Capabilities and Counterspace

Week 12 Directed Energy

Course Block 4 Integration

Week 13 Presentation of Findings and Recommendations from Research

Week 14 Course Wrap Up/ Class Discussion: So what about the So-called Third Offset Strategy? What did we miss? What’s next?

Syllabus and Course Changes: The syllabus is a general plan for the course. Deviations may be necessary and will be announced by the professor. The most likely changes will be to dates on the schedule. This syllabus is not a contract and is subject to change at the sole discretion of the instructor.
Reading Assignments for the Course:

WEEK 1: Course Introduction; Overview of the International Threat Environment - What’s Going On Out There?

Prior to the first class please read:


Suggested Readings after first class:


WEEK 2: The Rise of The Machines; Penetrate Exploit Disrupt Destroy


WEEK 3: Cyberology – What does the future hold?


Department of Defense Cyber Strategy 2018 Strategy
https://media.defense.gov/2018/Sep/18/2002041658/-1/1/1/CYBER_STRATEGY_SUMMARY_FINAL.PDF

WEEK 4: STUDENT PROPOSAL BRIEFINGS DUE

WEEK 5: STUDENT PROPOSAL BRIEFINGS DUE


*Exascale Computing*

https://science.energy.gov~/MEDIA/ASCR/ASCAC/PDF/REPORTS/EXASCALE_SUBCOMMITTEE_REPORT.PDF

The National Strategic Computing Initiative (NSCI) https://www.nitrd.gov/nsci/

https://www.energy.gov/downloads/doe-exascale-initiative


Website: https://www.exascaleproject.org/
Website: https://www.exascaleproject.org/exascale-computing-project/
Los Alamos National Laboratory: http://www.lanl.gov/projects/exascale-computing-project/

*Quantum Computing*

Website: https://disruptionhub.com/disrupted-computing-quantum-computers-come-to-the-cloud/
Website: https://computer.howstuffworks.com/quantum-computer.htm


https://www.cnas.org/publications/reports/quantum-hegemony

Swaim L. Travis, "Quantum Computing and Cryptography Today: Preparing for a Breakdown", University of Maryland University College (Suggested)

http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=21&cad=rja&uact=8&ved=2ahUKEwiV8_QYh-DaAhUlnuAKHeBhBRs4FBAWMAB6BAgAECC&url=http%3A%2F%2Fessic.umd.edu%2Fjom2%2Findex.php%2Ffaculty-and-staff%3Flayout%3Duser%26user_id%3D171%26dir%3DJSROOT%252Ftswaim1%26download_file%3DJSROOT%252Ftswaim1%252FQuantum%252BComputing%252Band%252BCryptography%2BToday.pdf&usg=AOvVaw2Jn0o0gseFhhrfcHQ9Zvg5

WEEK 7: Neuromorphic computing, deep learning and “big data”;

Neuromorphic Computing and AI


Website: https://www.humanbrainproject.eu/en/silicon-brains/


Potember, Richard. Perspectives on research in artificial intelligence and artificial general intelligence relevant to DoD. The MITRE Corporation McLean United States, 2017 Perspectives on Research in Artificial Intelligence and Artificial General Intelligence Relevant to DoD, JSR-16-Task-003, January 2017


**WEEK 8: Drones, Robotics and Autonomous Systems**

*Discussion of Wired for War: The Robotics Revolution and Conflict in the Twenty-First Century Discussion of Predator: the secret origins of the drone revolution.*


Horowitz, Michael and et al. *Strategic Competition in an Era of Artificial Intelligence* Center for a New American Security Washington, DC July 2018

**WEEK 10: Missile Proliferation- Hypersonic Missiles/Vehicles**

NASIC 2017 Ballistic and Cruise Missile Threat Report

https://fas.org/sgp/crs/nuke/R41464.pdf

Website: Missile Defense Agency: The Ballistic Missile Defense System (BMDS)

WEEK 11:  Space-Based Capabilities and Counterspace


Website: https://spacepolicyonline.com/topics/militarynational-security-space-activities/


WEEK 12:  Directed Energy


RESEARCH PAPERS DUE

WEEK 13:  Student Presentations of Findings and Recommendations from Research

POLICY RECOMMENDATION MEMORANDUMS DUE

WEEK 14:  WRAP UP/ Class Discussion: So what about the So-called Third Offset Strategy? What did we miss? What’s next?