Concepts of War and Cyber War

Course Number: 84-388/688
Fall 2016

Professor Chad C. Serena, Ph.D.

Thursday 6:30-9:20 PM
Office Hours Thursday 5:00-6:00 PM (by appointment)
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COURSE PRECÍS

This course examines traditional theories, concepts, and practices in international relations and warfare—conventional, unconventional, and modern—and relates them to the emerging dynamics of cyber war. The principle concepts examined in this course reflect, have shaped, and continue to shape state and non-state actor behaviors and their calculations of how to prepare for and prosecute warfare. These include, among others, conventional and nuclear deterrence, offense-defense dynamics, first strike capabilities, and irregular warfare. The course will focus on theory but will leverage history, military doctrine, and cases to highlight the challenges of integrating cyber war into defense planning and practice. Students will be challenged to consider how the 2009 introduction of cyberspace as a warfighting domain—in addition to land, maritime, air, and space—affects the ways that scholars and practitioners—operating with force structures and strategic, operational, and tactical concepts that are decades, if not centuries old—conceive of and practice warfare in the 21st Century.

The principle objective of this course is to introduce students to cyber war within the context of traditional, and emerging, concepts of armed and unarmed warfare. This course will focus on two core areas: 1) a discussion of traditional concepts of warfare in the physical domains; and, 2) a discussion of cyber war and its intersection with these traditional concepts.

COURSE REQUIREMENTS

1) 1x mid-term take-home essay (no more than 1000 words) (35%).
2) 1x open book in-class final exam (45%).
3) Class attendance and participation (20%).

Requirement #1: The question for the mid-term essay will be assigned week 3 and will be due 1 week after assignment, via email to the instructor prior to the start of class. Since these essays are short, I expect them to be very well written, concise, and direct. Avoid overly using the passive voice. Your essay should generally do the following: describe/define the problem and provide background, form an argument, present evidence, conduct analysis, and draw conclusions. Original research (beyond materials provided by the instructor) and ideas (your own) are expected. Late submissions, without prior excuse by the instructor, will result in a lower grade.

Requirement #2: Students will be asked a single question that must be answered within the 3-hour class period. Students can access and use any available sources (properly cited) in constructing their answers to this question.

Requirement #3: Students will be expected to attend all classes and to demonstrate that they have absorbed the assigned readings (see REQUIRED BOOKS and WEEKLY READINGS) by their contributions to the weekly discussion and debate. I cannot stress this enough: attendance will be taken and unexcused absences will affect this important dimension of your overall grade. Please contact the instructor prior to any class that will be missed. Emergencies and illnesses occur, but please ensure that the instructor is apprised of any problems affecting your weekly attendance and participation.

***Note: The amount of required reading for each week varies; please plan accordingly.
***Note: In the unfortunate event of a class cancellation, class readings and assignments will be postponed to the following week and merged with that week’s readings and assignments.

READING ASSIGNMENTS
All readings are annotated as follows:

(A) Assigned Book
(B) Available through the library
(C) Available online
(D) Available by request

Other Readings: Other readings, in addition to those listed in the class schedule, are highly recommended for your edification. Additional readings may be assigned during the course of the semester. It is recommended that each student take the time to find and read additional sources related to the subject of each particular class (with or without prompting by the instructor). The items required for each class are intended to introduce and frame a particular subject for discussion and by no means represent a comprehensive survey of any particular field or subfield. The instructor can recommend additional items of interest upon request. (See RECOMMENDED READINGS at the end of this syllabus.)

Take care of yourself. Do your best to maintain a healthy lifestyle this semester by eating well, exercising, avoiding drugs and alcohol, getting enough sleep, and taking some time to relax. This will help you achieve your goals and cope with stress.

All of us benefit from support during times of struggle. You are not alone. There are many helpful resources available on campus and an important part of the college experience is learning how to ask for help. Asking for support sooner rather than later is often helpful.

If you or anyone you know experiences any academic stress, difficult life events, or feelings of anxiety or depression, we strongly encourage you to seek support. Counseling and Psychological Services (CaPS) is here to help. Call 412-268-2922 and visit their website at http://www.cmu.edu/counseling/. Consider reaching out to a friend, faculty, or a family member you trust for help in getting connected to support services.
**CLASS SCHEDULE AND READINGS**

**Class 1: Oct 27**

**Introduction to Course/Syllabus**

**Introduction to Military Planning and Operations and the Traditional Warfighting Domains**

**Objectives:** Introduce students to the basics of military strategy, force planning, concepts of operations and doctrine, and the implementation of force in practice. Introduction to the traditional warfighting domains of land, air, sea/maritime, and space. These warfighting domains largely form the context within which traditional military planning processes are conducted and conceived.

**Recommended:**
- (C) DOTMLPF-P Analysis. (http://www.acqnotes.com/Acquisitions/DOTMLPF%20Analysis.html)
- (D) Biddle, *Military Power: Explaining Victory and Defeat in Modern Battle* (Chs. 1, 2).
- (D) Posen, *The Sources of Military Doctrine: France, Britain, and Germany Between the World Wars* (Chs. 1 and 2).
- (C) Army Doctrine Reference Publication 3-0, *Unified Land Operations*, 2012 (Chs. 1-3).
- (C) Joint Publication 3-0, *Operations*, 2011 (Chs. 1 and 5).

**Class 2: Nov 3**

**The Information Revolution and the Cyberspace Warfighting Domain**

**Objectives:** Discuss implications of the end of the Cold War, the “information revolution,” the Transformation program initiated by the U.S. Department of Defense in the 1990s, and impacts on the perception and conduct of military operations and intelligence gathering. Introduce students to the newest warfighting domain of cyberspace. Discuss the intersection of cyberspace with the traditional warfighting domains and the challenges associated with coordinating actions in both.

**Required Readings:**
- (A) Andress and Winterfeld (Chs. 1, 3, 4, 9, 11).
- (A) Sloan (Ch. 4)
- (A) Valeriano and Maness (Chs. 1-2).
- (C) Arquilla and Ronfeldt, *Networks and Netwars: The Future of Terror, Crime, and Militancy* (Ch. 1).
- (C) Joint Publication 3-12 (R), *Cyberspace Operations*, 2013 (Chs. 1, 2, 4(Skim)).

**Recommended:**
- (C) Caton, *Army Support of Military Cyberspace Operations: Joint Contexts and Global Escalation Implications*.
- (C) Libicki, *Cyberdeterrence and Cyberwar* (Chs. 6 and 7).
- (D) Osinga, “The Rise of Military Transformation,” in *A Transformation Gap?* (Ch. 2).
- (D) Mahnken, *Technology and the American Way of War Since 1945* (Ch. 5).
- (C) Joint Publication 2-0, *Joint Intelligence*, 2007 (Chs. 1-4).
- (D) Farrell, Rynning, and Terriff, *Transforming Military Power since the Cold War* (Ch. 1).
Class 3: Nov 10  

**Deterrence**

**Objectives:** Provide an overview of the concept of deterrence (conventional and nuclear) as one of the principle elements of defense strategies employed since the end of World War II. Discuss the concept of cyber deterrence, its relationship to traditional deterrence, and its likely efficacy.

**Required Readings:**
(A) Van Evera (Ch. 8).
(A) Sloan (Ch. 7).
(C) Libicki, *Cyberdeterrence and Cyberwar* (Chs. 2-3).

**Recommended:**

**Assignment:** Subject for mid-term essay distributed (due prior to class 4 [Nov 17th])

Class 4: Nov 17  

**Offense-Defense Theory**

**Objectives:** Discuss the main principles of Offense-Defense theory, stability, preemption, and the possible security dilemmas that result from pursuing strategic and tactical advantages for defensive purposes. Discuss considerations for stability and security dilemmas in light of the introduction of cyberspace as a warfighting domain. Examine the utility of the ability to conduct a “first strike,” and how cyber weapons and capabilities can possibly alter military calculations.

**Required Readings:**
(A) Van Evera (Chs. 3, 4, 6 (skim), and 7).
(C) Libicki, Brandishing Cyberattack Capabilities, Santa Monica, CA: RAND: 2013.

Recommended:

(C) Libicki, Crisis and Escalation in Cyberspace (Ch. 5).

Assignment: Mid-term essay due prior to class via email to the instructor.

Class 5: Dec 1 Cyberwar?

Objectives: Consider the likelihood (and degree) that states and other actors will engage in cyberwar either as a purely cyber endeavor or as part of other offensive or defensive operations.

Required Readings: (A) Sloan (Ch. 6).

**Recommended:**


**Class 6: Dec 8**

**In-class final exam**
**REQUIRED BOOKS**


**WEEKLY READINGS**


RECOMMENDED READINGS

Issues in Cyber War

Cases of Cyber Attack
-“Lithuania Under Cyber Attack,” The Economist, June 1, 2013.
-“Israel Braces as Hackers Launch Internet Attack,” LA Times, April 7, 2013.

U.S. Department of Defense and Cyber War

Stability and Nuclear Weapons
Reference