Nuclear Engineering 441 (NUCE 441)

Nuclear Security Threat Analysis and Assessment (3)

Spring 2017

NUCE 441: Educate students for conducting nuclear threat assessment and analysis for non-state actors and the threat to radiological facilities and supply lines.

Prerequisite: NUCE 301

Instructors: Professor Kenan Ünlü
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Mr. Matthew Zerphy
132 Reber Building, 863-6381, mxz206@engr.psu.edu

Lectures:
Resident: Mon, Wed, and Fri 10:10 am to 11:00 am, 365 Willard Building
Online: Videos available via Canvas following resident lectures.

Office Hours: Wednesday 11:30 am to 1:30 pm, 132 Reber Building or by appointment. Please schedule time with Mr. Zerphy in advance to ensure availability.

Learning Objectives:

The primary goal of this course is to educate the student in such a manner that on completion they are able to conduct a threat assessment and analysis for non-state actors (i.e., terrorist and criminal organizations) and the threat which they present to nuclear and radiological facilities and supply lines. Approaching the subject matter in this way forces a student to efficiently and effectively identify security threats and ultimately craft and articulate plausible policy responses to such threats. Specifically, students will focus on threats emanating from nuclear weapons, radiological material, and related technology. After completing this course, the student should be able to:

- Analyze current and future nuclear threats from countries and non-state or sub-state actors and provide recommendations on how to address these security issues.
- Define and analyze the various types of transnational threats and targets in order to craft effective policy responses.
- Describe nuclear weapons proliferation, including incentives and disincentives for proliferation.
- Analyze smuggling methods and counter-proliferation strategies.
- Identify materials of concern and the physical characteristics of these materials. Also prioritize these materials based on their attractiveness, location, and the threat they pose.
- Understand the history of terrorism, including its causes, motivations, strategies, and tactics, particularly regarding nuclear terrorism.
- Explain counterterrorism strategies and policies and the role of intelligence in counterterrorism, with a particular emphasis on the efforts of the United States Government.

**Texts / References:**

The instructor will post readings on Canvas at least one week in advance of the associated lecture topics. Lecture and discussion in the following class will revolve around the assigned readings. These readings will be supplemented with assignments from journals and periodicals as directed by the lecturer. There are no mandatory texts the course. Recommended texts are:


**Grading:**

Students are required to attend all sessions, arrive on time, and have read the Required Readings prior to each session.

The course grade will be computed as follows:

- Class Participation (15%)
- Quiz 1 (15%)
- Quiz 2 (15%)
- Working Group Presentation (20%)
- Final Policy Memorandum (35%)

**Course Evaluation:**

The grading scale for the class is as follows (numbers are in percentages):

- 94 - 100: A
- 90 - 93.99: A-
- 87 - 89.99: B+
- 84 - 86.99: B
- 80 - 83.99: B-
- 77 - 79.99: C+
- 70 - 76.99: C
- 60 - 69.99: D
- Below 60: F
Class Participation

Students should ensure that they attend class not simply prepared to discuss the readings, but to also be prepared to present the readings when called upon to do so by the instructor. Students may be randomly selected and asked to begin the discussion with a short presentation on the issues raised in the readings. Students should be prepared not simply to describe what they have read, but to critique arguments and present independent thoughts. As part of in-class discussions, students will engage in role-playing exercises, classroom debates and evaluate and analyze case studies. These activities are designed to enhance and deepen student understanding of the issues at hand and translate the readings and discussion into a simulated reality.

Distance student class participation will be integrated with the resident class in Canvas through online discussions. Format will be adjusted to accommodate the number of students so that each student has an opportunity to contribute by initiating and/or responding to readings, lectures, and presentations.

Working Group Presentation

Students will also prepare a team oral presentation in which the individual teams will provide background analysis to a “Head of Agency” (role played by the lecturer) on a terrorist operation or organization. The lecturer will determine Working Groups and allocate subject areas. Each group will produce a short paper and a short presentation. Distance student participation in presentations will be conducted via videoconference, teleconference, or Canvas chat depending upon the best fit for each group and its students.

Final Policy Memorandum

The final assignment, which will build on the working group presentation, will be a Policy Memorandum. Students by this stage will hopefully have developed a particular area of interest which should form the basis of their chosen topic. Students should select a contemporary and significant issue to analyze and make recommendations to a policymaker as to how best address the issue in question. Topics will be approved by the instructor. The paper should be no more than 5 double spaced pages, using 12-point Arial font with 1” margins at top and bottom and 1.25 margins at right and left.

The deadline for the Final Policy Memorandum is at the start of class on April 17, 2017. Students will present and discuss the policy memorandums as a group in class and for online discussion. Late papers will be penalized five points per day (from A to A-, from A- to B+, etc.). Incompletes will not be allowed except in extreme or unusual circumstances (e.g. serious illness). Problems with technology are not an acceptable reason for late work.

Academic Integrity:

The College Academic Integrity Policy applies; please become familiar with the policy at: http://www.engr.psu.edu/faculty-staff/academic-integrity.aspx

The University defines academic integrity as the pursuit of scholarly activity in an open, honest and responsible manner. All students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts. Dishonesty of any kind will not be tolerated in this
course. Dishonesty includes, but is not limited to, cheating, plagiarizing, fabricating information or citations, facilitating acts of academic dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students. Students who are found to be dishonest will receive academic sanctions and will be reported to the University's Office of Student Conduct for possible further disciplinary sanctions.

**Student Disability Resources:**

Penn State welcomes students with disabilities into the University's educational programs. If you have a disability-related need for reasonable academic adjustments in this course, contact Student Disability Resources (SDR) at 814-863-1807 (V/TTY). For further information, please visit the SDR website at

http://equity.psu.edu/ods/

In order to receive consideration for course accommodations, you must contact SDR and provide documentation – see the documentation guidelines at

http://equity.psu.edu/student-disability-resources/guidelines

If the documentation supports the need for academic adjustments, SDR will provide a letter identifying appropriate academic adjustments. Please share this letter and discuss the adjustments with your instructor as early in the course as possible. You must contact SDR and request academic adjustment letters at the beginning of each semester.

**Counseling & Psychological Services (CAPS):**

CAPS can help students resolve personal concerns that may interfere with their academic progress, social development, and satisfaction at Penn State. Some of the more common concerns include anxiety, depression, difficulties in relationships (friends, roommates, or family); sexual identity; lack of motivation or difficulty relaxing, concentrating or studying; eating disorders; sexual assault and sexual abuse recovery; and uncertainties about personal values and beliefs. You can contact CAPS by calling the Main CAPS number/Appointment Scheduling: 814-863-0395 (Please call between the hours of 8am and 5pm, Monday-Friday to schedule an appointment) or visit us at our office location, 5th Floor Student Health Center.

Online Resources for Relaxation: It's important to take care of yourself. There are a number of valuable online resources that you can use for relaxation and stress reduction. Learn how stress impacts your health and life, as well as some self-help strategies for managing it through the PSU Student Affairs EDGE online workshop

(http://edge.psu.edu/workshops/StressMgmt/).

Sexual Assault and Relationship Violence Hotline: A hotline has been established for victims and observers of sexual assault and relationship violence. Trained counselors on the hotline will help students access appropriate resources. Penn State students from any campus can call 1 (800) 560-1637 to access the 24 hour a day, seven day a week hotline.
Tentative Schedule (subject to small adjustment during semester):

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<th>Lecture Topics</th>
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<td>Course Overview and Defining “Nuclear Threat”</td>
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<td>2</td>
<td>Nuclear Material Characterizations</td>
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<td>3</td>
<td>Terrorism: Historical Context, Causes and Motivations, and Strategy and Tactics</td>
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<td>4</td>
<td>Cyber Threat to Nuclear Installations. Threat Assessments (Methodology, Process, and Products).</td>
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<td>WMD Terrorism</td>
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<td>Proliferation (Nuclear Materials and Technologies)</td>
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<td>11</td>
<td>U.S. National Security: Organizations, Roles, and Authorities</td>
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<td>U.S. Intelligence Community and The Role of Intelligence in Counter-Terrorism</td>
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<td>Counter-Terrorism Strategy and Policies</td>
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