

**Syllabus**  
**Critical Infrastructure Risk Management**  
**SCST 6362**  
**Fall 2017**  
**Security Studies Department**  
**College of Criminal Justice**  
**Sam Houston State University**

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**Course Description**

Welcome to critical infrastructure protection and risk management, which is now part of the Masters in Homeland Security. This course is part of the optional critical infrastructure protection certificate and builds upon the concepts and substantive foundation from the critical infrastructure protection course.

Critical infrastructure protection is an emerging/developing field of study. As society becomes increasingly dependent on new technologies, the role these technologies play in controlling critical infrastructures both new and old highlight the need to understand the interdependencies and the difficulties of governing sprawling infrastructures across many sectors. Nothing could be more important than the protection of infrastructure so critical that it has become the foundation of our civilization.

**Course Textbook(s)**

1. Newsome, Bruce (2014) *A Practical Introduction to Security and Management*. Sage Publications [Newsome]

There are also additional mandatory readings on specific topics, but these can be found for free on the web (see specific days of the schedule for details). Three specific readings worth mentioning are:

1. National Academies of Science. (2010) *A Review of DHS's Approach to Risk Analysis* National Academies Press. (This is available both in print and as a FREE electronic version at [http://www.fema.gov/pdf/government/grant/2011/fy11\\_hsgp\\_risk.pdf](http://www.fema.gov/pdf/government/grant/2011/fy11_hsgp_risk.pdf)) [NAS]
2. Hazard sheets describing 10 homeland security hazards will be discussed. These hazard sheets can be found online in Lundberg, R. 2013. "Comparing Homeland Security Risks Using a Deliberative Risk Ranking Methodology." RAND Corporation. Doctoral dissertation, Pardee RAND Graduate School. Appendix D. [http://www.rand.org/pubs/rgs\\_dissertations/RGSD319.html](http://www.rand.org/pubs/rgs_dissertations/RGSD319.html) [hazard sheets]
3. The DHS Risk Lexicon, available online at <http://www.dhs.gov/dhs-risk-lexicon>

## **Course Skill Development Goals**

### **Essential Goals**

1. “Learning to apply course material (to improve thinking, problem solving and decisions)” to critical Infrastructure protection activities in the homeland security enterprise.
2. “Developing specific skills, competencies, and points of view needed by professionals in the field most closely related to” critical infrastructure protection as part of the homeland security enterprise.

### **Important Goals:**

1. “Learning to analyze and critically evaluate ideas, arguments, and points of view” by participating in online discussions on course readings and the course research paper assignment.
2. Developing skill in expressing oneself orally and in writing.

### **Substantive Course Goals**

The course aims to familiarize students with the theoretical foundations of critical infrastructure protection risk management. Ultimately the goal of this course is to improve the security of the United States and world by coming to deeper understandings of critical infrastructure risk management through the creation of a cadre of professionals with a deeper understanding of these issues and theoretical frameworks. Students will become familiar with the principles of risk management, cost benefit analysis, Bayes theorem, game theory, to supplement the network based methods of analysis learned in the critical infrastructure protection course of the previous semester. This course will provide students with tangible certifications in the field of critical infrastructure protection through the utilization of FEMA online training courses and is part of a larger certification in critical infrastructure from Sam Houston State University which is in turn part of a larger Master program in Homeland Security in the Security Studies Department.

### **Academic Honesty Policies**

Students will be held to the highest standards of academic honesty. Students should review the academic honesty policies of Sam Houston State University available here [http://www.shsu.edu/dept/academic-affairs/faculty-handbook/academic\\_dishonesty.html](http://www.shsu.edu/dept/academic-affairs/faculty-handbook/academic_dishonesty.html) and should expect enforcement in accordance with the highest standards of those policies. The instructor reserves the right to check papers against turnitin.com a national anti-plagiarism database.

### **Course Expectations: Netiquette**

Good netiquette is particularly important in an online course. Students are expected to actively post content in the virtual space. Where appropriate in text citations are necessary.

### **Opportunity for Course Feedback at Mid-points**

The instructor will provide regular feedback to students via discussion boards, email, and office hours. The instructor also welcomes and appreciates feedback on the course design. Given this is one of the inaugural classes in a new program, student feedback will be critical to the improvement of future iterations of the course.

### **Religious Holidays**

Accommodations will be made to students for religious holidays and the associated travel needed for them in accordance with Texas state law and the policies of Sam Houston State University. If students have any questions or concerns they should not hesitate to contact the instructor via email.

### **Disabilities**

Any student seeking reasonable accommodation for a disability in accordance with federal, state, local law and policy of Sam Houston State University must contact Offices of Students with Disabilities located in the Counseling Center. <http://www.shsu.edu/dept/disability/>

After contacting this office students should feel free and comfortable contacting the instructor about any disability issue so that reasonable accommodations can be made.

### **Make Up Midterm Policy**

This course has no midterm or final but in the event that the instructor adds one and the student cannot attend, the student must immediately contact the instructor with the reason preferably ahead of time and the instructor will then at his/her discretion provide a reasonable alternative for the student to retake the midterm.

### **Course Structure**

1. Participation in weekly discussion boards (36%)
2. International Comparison (10%)
3. Risk Analysis (10%)
4. Risk Management Plan (25%)
5. Risk ranking (10%)
6. Online Training Courses and Certifications (9%)

### **Assignments:**

1. **Participation in Online Discussions Weekly (36%)** Instructor poses initial question to inspire class discussion on discussion board in blackboard. Students respond with comments, questions, and thoughtful discussion. There will be 9 discussions of up to 4 points each. Posting on time and entering into discussions of with others is not enough to get the entire 4 points; average posts will only receive 3 points while only exceptionally insightful or productive posts will receive the full 4 points.
2. **Smaller assignments—THIRA and Risk Analysis (20%)** There will be two smaller assignments—an examination of THIRA and an analysis of a risk. These assignments are similar to the Blackboard discussions but will be somewhat longer. Accordingly, they will be worth more points. The assignments will be due in week 6 and week 8. They do not require a lot of writing—they may be as short as a couple of pages—but will require more consideration or analysis. Details on the assignments will be given in the course of class.
3. **Risk Management Plan (25%)** Students will be assigned a topic to write about related to critical infrastructure risk management. They will be expected to write a memo on a particular asset of critical infrastructure, the risk to that asset (using a particular framework), and their recommended activities to manage the risk to the asset. It should be approximately 8 pages, but any figures (and there will be figures) will not be included in that page count.

4. **Independent Studies (9%)** Students are required to complete online training sessions and submit evidence of completion to instructor. Students must also create a resume in PreparingTexas.org to save all certifications for employment verification.
5. **Synchronous online exercise (10%) Risk Ranking Session** based on Deliberative Risk Ranking Methodology. Synchronous with Instructor in week 7. Students must schedule with assigned group.

	Date	Topic(s)	Reading	Assignment
0	By 8/27	<b>Introduction</b>	1. No reading, but online videos	Introduce yourself
1	By 9/3	<b>What is Risk?</b>	1. Newsome, Chapters 1, 2 2. Risk Management Fundamentals Homeland Security Review April 2011. <a href="http://www.dhs.gov/xlibrary/assets/rma-risk-management-fundamentals.pdf">http://www.dhs.gov/xlibrary/assets/rma-risk-management-fundamentals.pdf</a> (30 pages) 3. DHS Risk Lexicon 72 pages <a href="http://www.dhs.gov/xlibrary/assets/dhs-risk-lexicon-2010.pdf">http://www.dhs.gov/xlibrary/assets/dhs-risk-lexicon-2010.pdf</a> Definitions for risk, risk management, threat, vulnerability, likelihood, and consequence at a minimum. Others as needed 4. <a href="http://cip.gmu.edu/the-cip-report/past-issues-catalog/">http://cip.gmu.edu/the-cip-report/past-issues-catalog/</a> as needed	Discussion Board- CIP Report Report  FEMA Independent Study IS-454 Fundamentals of Risk Management <a href="http://training.fema.gov/is/courseoverview.aspx?code=is-454">http://training.fema.gov/is/courseoverview.aspx?code=is-454</a>
2	By 9/10	<b>Risk analysis, Hazard identification; Threat and vulnerability</b>	1. Newsome, Chapters 3, 4, 5 2. "The Strategic National Risk Assessment in Support of PPD 8." DHS, December 2011. 3. Rollins, John, Liana Sun Wyler, and Seth Rosen. <i>International Terrorism and Transnational Crime: Security Threats, US Policy, and Considerations for Congress</i> . CRS, 2010. 4. Libicki, Martin C., Peter Chalk, and Melanie Sisson. <i>Exploring Terrorist Targeting Preferences</i> . Rand, 2007. <i>FEMA Handbook of Rapid Visual Screening of Buildings to Evaluate Terrorist Events FEMA-455</i> <a href="http://www.fema.gov/media-library/assets/documents/2298">http://www.fema.gov/media-library/assets/documents/2298</a>	Discussion Board- Rapid Visual Screening
3	By 9/17	<b>Likelihood estimation: Historical and Modeling, Game Theory,</b>	1. Newsome Chapter 6 2. National Academies, p. 44-50 3. Willis, Henry H, Andrew R Morral, Terrence K Kelly, and Jamison Jo Medby. <i>Estimating Terrorism Risk</i> . Rand Corporation, 2006.	Discussion Board- Which would you use?

		<b>Expert Opinion, Other considerations</b>	<p><a href="http://www.dtic.mil/dtic/tr/fulltext/u2/a449118.pdf">http://www.dtic.mil/dtic/tr/fulltext/u2/a449118.pdf</a></p> <p>4. Epstein, Joshua M. "Why Model?" <i>Journal of Artificial Societies and Social Simulation</i> 11, no. 4 (2008): 12.</p> <p>5. <a href="http://jasss.soc.surrey.ac.uk/11/4/12.html">http://jasss.soc.surrey.ac.uk/11/4/12.html</a></p> <p>6. Cox Jr, Louis Anthony Tony. "Game Theory and Risk Analysis." <i>Risk Analysis</i> 29, no. 8 (2009): 1062–68. <a href="http://faculty.nps.edu/dlalders/ns4061/session12/Cox-RiskAnalysis-GameTheory-June2009.pdf">http://faculty.nps.edu/dlalders/ns4061/session12/Cox-RiskAnalysis-GameTheory-June2009.pdf</a></p> <p>7. Tambe, Milind, Manish Jain, James Adam Pita, and Albert Xin Jiang. "Game Theory for Security: Key Algorithmic Principles, Deployed Systems, Lessons Learned," 1822–29. IEEE, 2012. <a href="http://teamcore.usc.edu/manish/files/allerton.pdf">http://teamcore.usc.edu/manish/files/allerton.pdf</a></p> <p>8. Clauset, A. M. Young, K. Gleditsch (2007) "On the Frequency of Severe Terrorist Events" <i>Journal of Conflict Resolution</i>, 51(1): 58-88 available at <a href="http://arxiv.org/pdf/physics/0606007">http://arxiv.org/pdf/physics/0606007</a></p>	
4	By 9/24	<b>Consequence estimation</b>	<p>1. Newsome Chapter 7</p> <p>2. Frey, Bruno S, Simon Luechinger, and Alois Stutzer. "Calculating Tragedy: Assessing the Costs of Terrorism." <i>Journal of Economic Surveys</i> 21, no. 1 (2007): 1–24.</p> <p>3. Bram, Jason, James Orr, and Carol Rapaport. <i>Measuring the Effects of the September 11 Attack on New York City</i>. National Emergency Training Center, 2002. <a href="http://www.nyfedeconomists.org/research/epr/02v08n2/0211rapa.pdf">http://www.nyfedeconomists.org/research/epr/02v08n2/0211rapa.pdf</a>.</p> <p>4. Rosoff, Heather, and Detlof Von Winterfeldt. "A Risk and Economic Analysis of Dirty Bomb Attacks on the Ports of Los Angeles and Long Beach." <i>Risk Analysis</i> 27, no. 3 (2007): 533–46.</p> <p>5. Using HAZUS-MH for Risk Assessment: How-To Guide. 2006. Step 4: Estimate Losses <a href="http://www.fema.gov/media-library-data/20130726-1530-20490-2929/fema433_step4.pdf">http://www.fema.gov/media-library-data/20130726-1530-20490-2929/fema433_step4.pdf</a></p>	<b>Discussion Board-consequences ranking</b>

5	By 10/1	<b>Bringing them Together</b>	<ol style="list-style-type: none"> <li>1. Reviewing the Department of Homeland Security's Approach to Risk Analysis, Ch. 1 <a href="http://www.fema.gov/pdf/government/grant/2011/fy11_hsgp_risk.pdf">http://www.fema.gov/pdf/government/grant/2011/fy11_hsgp_risk.pdf</a></li> <li>2. Giannopoulos, G., R. Filippini, M. Schmitter (2012) "Risk assessment methodologies for Critical Infrastructure Protection. Part I: A state of the art" Available at <a href="http://ec.europa.eu/home-affairs/doc_centre/terrorism/docs/RA-ver2.pdf">http://ec.europa.eu/home-affairs/doc_centre/terrorism/docs/RA-ver2.pdf</a></li> <li>3. Cox Jr, Louis Anthony Tony. "Some Limitations of 'Risk= Threat× Vulnerability× Consequence' for Risk Analysis of Terrorist Attacks." <i>Risk Analysis</i> 28, no. 6 (2008): 1749–61. <a href="http://onlinelibrary.wiley.com/doi/10.1111/j.1539-6924.2008.01142.x/full">http://onlinelibrary.wiley.com/doi/10.1111/j.1539-6924.2008.01142.x/full</a></li> <li>4. Anthony Tony Cox, Louis. "What's Wrong with Risk Matrices?" <i>Risk Analysis</i> 28, no. 2 (2008): 497–512. <a href="http://onlinelibrary.wiley.com/doi/10.1111/j.1539-6924.2008.01030.x/full">http://onlinelibrary.wiley.com/doi/10.1111/j.1539-6924.2008.01030.x/full</a></li> <li>5. What's right with Risk Matrices <a href="http://www.jakeman.com.au/media/whats-right-with-risk-matrices">http://www.jakeman.com.au/media/whats-right-with-risk-matrices</a></li> </ol>	<p>Discussion board- risk matrix</p> <p>Professor will describe assignment of Describe Hazard</p>
6	By 10/8	<b>THIRA</b>	<ol style="list-style-type: none"> <li>1. <i>Threat and Hazard Identification and Risk Assessment Guide, Second Edition</i>. Department of Homeland Security, August 2013.</li> </ol>	THIRA Exercise
7	By 10/15	<b>Assessed risks DMRR</b>	<ol style="list-style-type: none"> <li>1. Lundberg, R., and H. Willis (2015) "Assessing Homeland Security Risks" Homeland Security Affairs, Vol. XI <a href="https://www.hsaj.org/articles/7707">https://www.hsaj.org/articles/7707</a></li> <li>2. Hazard sheets</li> </ol>	DMRR exercise
8	By 10/22	<b>Risk management</b>	<ol style="list-style-type: none"> <li>1. Van Der Vegt, G., P. Essens, M. Wahlstrom, and G. George (2015) "Managing Risk and Resilience" <i>Academy of Management Journal</i>, 58(4), 971</li> <li>2. <i>National Protection Framework</i>. Department of Homeland Security, July, 2014 <a href="http://www.fema.gov/media-library/assets/documents/97350">http://www.fema.gov/media-library/assets/documents/97350</a></li> <li>3. <i>National Mitigation Framework</i>. Department of Homeland Security, May 2013. <a href="http://www.fema.gov/media-library-data/20130726-1914-25045-">http://www.fema.gov/media-library-data/20130726-1914-25045-</a></li> </ol>	<p>Assignment DUE- Describe Hazard</p>

			<a href="#">9956/final_national_mitigation_framework_20130501.pdf.</a>	
9	By 10/29	<b>Cultures; Tolerance and Sensitivity</b>	<ol style="list-style-type: none"> <li>1. Newsome Chapter 8, 9</li> <li>2. Derby, Stephen L, and Ralph L Keeney. "Risk Analysis: Understanding "How Safe Is Safe Enough?"." <i>Risk Analysis</i> 1, no. 3 (1981): 217–24. <a href="http://onlinelibrary.wiley.com/doi/10.1111/j.1539-6924.1981.tb01418.x/abstract;jsessionid=8A0A61A9047FED38B3467D124E263071.f04t02?deniedAccessCustomisedMessage=&amp;userIsAuthenticated=false">http://onlinelibrary.wiley.com/doi/10.1111/j.1539-6924.1981.tb01418.x/abstract;jsessionid=8A0A61A9047FED38B3467D124E263071.f04t02?deniedAccessCustomisedMessage=&amp;userIsAuthenticated=false</a></li> <li>3. Gregory, R., and R. L Keeney. "Creating Policy Alternatives Using Stakeholder Values." <i>Management Science</i> 40, no. 8 (1994): 1035–48. <a href="http://www.jstor.org/stable/2633092">http://www.jstor.org/stable/2633092</a></li> </ol>	Discussion board
10	By 11/5	<b>Controls and strategies; Recording, communicating, assuring, and auditing:</b>	<ol style="list-style-type: none"> <li>1. Newsome Chapter 10, 11</li> <li>2. Patricia H., N. Longstaff, et al. (2010) "Building Resilient Communities: A Preliminary Framework for Assessment" Homeland Security Affairs <a href="https://www.hsaj.org/articles/81">https://www.hsaj.org/articles/81</a></li> </ol>	Discussion board
11	By 11/12	<b>Managing risks under uncertainty</b>	<ol style="list-style-type: none"> <li>1. Pate-Cornell, E. (2012) "On 'Black Swans' and 'Perfect Storms': Risk Analysis and Management When Statistics Are Not Enough." <i>Risk Analysis</i>, 32(11)</li> <li>2. Dewar, J., C. Builder, W. Hix, M. Levin (1993) Assumption Based Planning. Rand Corporation <a href="http://www.rand.org/content/dam/rand/pubs/monograph_reports/2005/MR114.pdf">http://www.rand.org/content/dam/rand/pubs/monograph_reports/2005/MR114.pdf</a></li> <li>3. Lempert, R., S. Popper, et al. (2013) Making Good Decisions Without Predictions. RAND Corporation <a href="http://www.rand.org/pubs/research_briefs/RB9701.html">http://www.rand.org/pubs/research_briefs/RB9701.html</a></li> </ol>	Discussion board- ABP
12	By 11/19	<b>Specific examples in CI-Transportation</b>	<ol style="list-style-type: none"> <li>1. Newsome Chapter 15</li> <li>2. CHDS self-study in Transportation Security <a href="https://www.chds.us/olc/course/view.php?id=5">https://www.chds.us/olc/course/view.php?id=5</a> MUST REGISTER ONLINE</li> <li>3. Lundberg, R. and T. LaTourrette (2012) "The Benefits of Security Depend on How It Shapes</li> </ol>	Proof of CHDS self-study  Discussion board- where do

			<p>Adversary Choices: The Example of the Federal Air Marshal Service” in Efficient Aviation Security. RAND Corporation. Available at <a href="http://www.rand.org/pubs/monographs/MG1220.html">http://www.rand.org/pubs/monographs/MG1220.html</a></p> <p>4. Stewart and Mueller (2008) “A risk and cost-benefit assessment of United States aviation security measures” Available at <a href="https://cryptome.org/avsec-assess.pdf">https://cryptome.org/avsec-assess.pdf</a></p>	you stand on aviation security?
13	By 11/26	<b>Operational and logistical security, Physical security</b>	<p>1. Newsome Chapter 12, 13</p> <p>2. FEMA-452 Risk Assessment A How-To Guide to Mitigate Potential Terrorist Attacks Against Buildings, Chapter 5 available at <a href="http://www.fema.gov/fema-452-risk-assessment-how-guide-mitigate-potential-terrorist-attacks-against-buildings#">http://www.fema.gov/fema-452-risk-assessment-how-guide-mitigate-potential-terrorist-attacks-against-buildings#</a></p>	FEMA IS-395, available at <a href="http://training.fema.gov/is/course-overview.aspx?code=IS-395">http://training.fema.gov/is/course-overview.aspx?code=IS-395</a>
14	By 12/3	<b>Info sec, personal sec</b>	1. Newsome Chapter 14, 16	
15	By 12/6	<b>Finals Week</b>	•	Risk management plan