

CE 582

Transportation System Security and Emergency Management

USC
Viterbi

School of Engineering
*Sonny Astani Department
of Civil and Environmental
Engineering*



CE 582 - Transportation System Security and Emergency Management

Units: 4

Term: Spring 2024

Wednesdays: 6:00 PM-9:20 PM

Location: KAP 134

Instructor: **Shahed Rowshan, Ph.D., P.E.**

Office: KAP 203

Office Hours: Wednesdays 5:00 PM-6:00 PM and by appointment

Contact Info: srowshan@usc.edu

Phone: (310) 995-5025

IT Help: engrhelp@usc.edu for Viterbi IT
consult@usc.edu, 0-5555 for ITS

I. CATALOGUE COURSE DESCRIPTION

Multimodal transportation resilience with emphasis on transit systems. Principles of emergency management, preparedness, vulnerability assessment, countermeasures. Related topics in policy and economics.

II. EXPANDED COURSE DESCRIPTION

Transportation is the lifeline of our nation, connecting people, supporting the economy, and facilitating the delivery of goods and services. This course presents the fundamental concepts of multi-modal transportation system security, with emphasis on transit systems, along with principles of emergency management and preparedness. In addition to transportation safety and security discussions, this course includes topics related to impacts that COVID-19 had on supply chain to the transportation systems, policy and economics involved in securing the transportation systems, and impacts of the Infrastructure Investment and Jobs Act.

On September 11, 2001, nearly 3,000 people were killed in a series of coordinated terrorist attacks in New York, Pennsylvania and Virginia. The course reviews the effect of these attacks—and other attacks on surface transportation assets, such as the bombings in Madrid, London, and Moscow—to demonstrate the vulnerability of the transit assets to disruption and the consequences of the attacks on people, property, and the economy. The course also discusses emergencies arising from terrorist threats highlighting the need for transportation managers to minimize the vulnerability of people and assets through incident prevention, mitigation, preparedness, response, and recovery.

CE 582

Transportation System Security and Emergency Management

The U.S. Department of Homeland Security (DHS) provides guidance for developing contingency plans for continuity of operations (COOP). COOP planning facilitates the performance of department/agency essential functions during any emergency or situation that may disrupt normal operations. The course provides an overview of how COOP plans prepare a transportation agency for response during, and recover from a disruption in internal operations whether caused by severe weather, other natural or man-made disasters, or a terrorist attack, safeguarding people, places, and equipment—while at the same time ensuring operations continuity.

III. LEARNING OBJECTIVES AND OUTCOMES

Students who successfully complete the course will gain a basic understanding of the concepts related to multi-modal transportation system resilience and emergency management and preparedness. The course is appropriate for graduate students in the Viterbi and Price Schools, subject to approval of their program advisors.

The course provides the history, state of practice, policies, and economics of transportation security and federal and state policies in emergency management and preparedness. The class discussions include but not limited to the following topics:

- Basic theories of security, resilience, and emergency management
- The integrated nature of the nation's critical infrastructure and the threats to transportation in each surface mode
- An overview of the Multimodal Transportation Safety, Security, and Emergency Management
- Cybersecurity and practices for the Protection of Transportation Infrastructure from Cyber Incidents
- Applications of Artificial Intelligence (AI) to the Multimodal Transportation Safety, Security, and Emergency Management
- Federal agencies working in emergency management and transportation security, their intelligence and response requirements and capabilities, their roles, responsibilities and policies
- Infrastructure Investment and Jobs Act (Infrastructure Law, 2021)
- Surface Transportation Security – Threats and Strategies with Case Studies
- Bridge/Tunnel/Highway Infrastructure Vulnerability Assessment
- Prioritizing High-Value Transportation Choke Points
- Risk Management Concepts and Risk Mitigation Strategies
- Transit Security Risks – Threats and Strategies with Case Studies
- Aviation Security - Threats and Strategies
- Freight and Maritime Transportation Security – Threats and Strategies
- Impact that COVID-19 had on Supply Chain and Economic Impacts of Disruptions to the Goods Movement System

CE 582

Transportation System Security and Emergency Management

- The types of disasters that have occurred in California, the U.S. and selected other nations, and their significant economic impacts
- Emergency-Response Preparedness, Continuity of Operations (COOP)
- Transportation and Economic Consequences of Terrorist Attacks
- Chemical, Radiological, Biological, Nuclear Threats and Countermeasures to the Transit System
- Applying Military Situation Awareness and Technologies to Transportation Applications
- An International View of the Preparedness, Response, and Recovery in the Transit Industry with Case Studies

The students are expected to actively participate in class discussions. Each student conducts a comprehensive independent research effort, on topics related to multi-modal transportation system security and emergency management and preparedness to enhance their understanding of a specific topic of their interest.

A field trip will be scheduled during the semester that allows students to observe the operation of a transportation agency security measures in the Greater Los Angeles area. Invited guest lecturers present expert transportation system security discussions, bringing practical experience to the classroom lecture, and promoting interactive discussions with the students.

Students are informed of significant local, national and international transportation system security and emergency management meetings and conferences and are guided to attend local events.

IV. STUDENT EVALUATION

The following criteria are used for grading:

Class Component	% of Course Grade
ACTIVE Participation	10%
Class Assignments and quiz	10%
Midterm Examination	20%
Independent Research Paper and Presentation Content 30%, Technical Format 5%, Presentation 5%	40%
Comprehensive Final Examination	20%
Total	100%

Course final grades will be determined using the following scale:

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
94-100	90-93.9	87-89.9	83-86.9	80-82.9	77-79.9	73-76.9	70-72.9	67-69.9	63-66.9	60-62.9	59 or below

Grading Timeline

Grades will be provided within one week after each exam.

CE 582

Transportation System Security and Emergency Management

V. FIELD TRIP

In conjunction to class discussions, a field trip to observe the security operations of a transportation agency in Los Angeles area is arranged for this class. The site visit is conducted during business hours. Attendance to site visits is required and highly recommended. The facility to be visited is not necessarily accessible to the public. The date and time of the site visit is decided based on agency availability. Ample advance notice is given to the students to plan for the day allocated to the site visits.

Details of the visit such as transportation arrangements will be discussed in class. Students will be required to write a report about what they learn from the facility visited.

VI. CLASS PARTICPATION/GROUP DISCUSSIONS

Our nation's transportation systems are open and vulnerable assets. Current world events and the attacks of 9/11 have resulted in tightening of airport security, but other assets, in particular the transit assets, are highly vulnerable. The lecture topics include the latest information in research and practice in transportation system security and emergency management. Students are highly encouraged to participate in class discussions and to bring up topics of their interest or in the news to class. The instructor will also provide questions and topics for discussions and students are to participate in discussions in small groups. Each group will present their thoughts and findings to the class.

VII. INDEPENDENT RESEARCH PAPER

Students conduct individual independent research on a selected topic related in today's transportation threat and vulnerabilities, countermeasures, and emergency management practice and related topics. This effort is a significant part of this course and student evaluation.

The steps in fulfilling the research requirements are as follows:

- i) Research Topic Selection
- ii) Research Proposal
- iii) Class Presentation
- iv) Paper Submittal

The specific requirements and expectations for completion of the research effort are as follows:

i) Research Topic Selection

The topic chosen for the research may deal with technical, institutional, policy, or societal aspects of Transportation System Security and Emergency Management. The topic will be selected in consultation with the instructor and the final selection will be with his approval.

CE 582

Transportation System Security and Emergency Management

In selecting the topic, the students should think beyond simply presenting a history or a literature survey. The goal is to think of what new ideas and innovative solutions can be added to a particular topic. The research paper should be written in student's own word, with careful attention to proper citation of sources.

For the research, every student will conduct an effort aimed at identifying factors that influence transportation system security and safety problems and innovative solutions/countermeasures, which might address the problem. The students can choose a topic that is of interest to them and it can be a research topic that they are working on or intend to develop into a thesis or dissertation.

ii) Research Proposal

The students are required to prepare a research topic proposal. The proposal is limited to two pages. The proposal shall include the following:

- Student Name
- Research Topic Title
- A paragraph describing the topic and specific objectives of the paper
- Preliminary outline of subjects in the paper
- List of preliminary literature research references (minimum of ten recent relevant journal articles or technical reports).

iii) Research Class Presentation

Students are required to present the research results in the classroom in a professional manner at the last class. The presentation should take about 20 minutes and will follow with up to a 10-minute period for questions and discussions. The presentation is to be made with Power Point, videos, and other visual aids.

Students are required to attend the class presentations. The presentations should be looked upon as an opportunity to gain experience making a professional presentation, in a supportive environment, among peers.

Presentation Evaluation

Students will be evaluated on their presentation as follows:

- Knowledge of topic
- Independent and innovative ideas/approach
- Logic of conclusions and recommendation
- Overall impression/Quality of visual aids
- Ability to present and answer questions

iv) Final Research Paper Report Format

The paper requirements are similar to those of the Transportation Research Board (TRB) papers.

CE 582

Transportation System Security and Emergency Management

<https://trb.secure-platform.com/a/page/TRBPaperReview>

The paper should include the following sections, in the given order:

(1) Title page, (2) Abstract, (3) Table of Contents, (4) Main body of paper with including tables and figures (5) Acknowledgement, if any, (5) References, and (6) Appendices, if any.

The abstract should not be longer than 250 words.

- All tables and figures should be labeled, with sources cited.
- Use one-inch margins at top, bottom, left, and right.
- Number pages in lower right corner.

Additional details and instructions are made available during lectures.

VIII. MID TERM AND FINAL EXAMS

Mid Term and final exams will be comprehensive multiple-choice questions on broad topics included in the lectures, class discussions, reference material, field trip, guest lecture, and student presentations.

IX. REQUIRED TEXTS AND REFERENCES

The reading material for the class includes the recommended text books, instructor's lectures and extensive use of online references provided during lectures. These are discussed in class.

The following references are recommended reading:

Ref. 1) Edwards, F. L., and D. Goodrich, *Introduction to Transportation Security*, CRC Press, 2012

Ref. 2) Hakim, S., G. Albert, and Y. Shiftan, *Securing Transportation Systems*, Wiley, 2015

Ref. 3) Sun, Y., and Houbing Song, *Secure and Trustworthy Transportation Cyber-Physical Systems*, Springer, 2017

Ref. 4) Haddow, G. D., J. A. Bullock, and D. P. Coppola, *An Introduction to Emergency Management*, 7th Edition, Elsevier, 2020

Ref. 5) Clark, Robert M. and Hakim, Simon, *Cyber-Physical Security: Protecting Critical Infrastructure at the State and Local Level*, Springer, 2016

The course makes extensive use of material from the research conducted by TRB Cooperative Research Programs on Security, Emergency Management, and Infrastructure Protection. The latest publications will be discussed in class. A list of some of the recent funded research and publications is included in this document:

<http://onlinepubs.trb.org/onlinepubs/dva/CRP-SecurityResearch.pdf>

CE 582

Transportation System Security and Emergency Management

Course Notes

Additional selected readings are assigned in class.

Prerequisite(s): None

Co-Requisite(s): None

Concurrent Enrollment: None

Recommended Preparation: Prior coursework in transportation engineering at the level of CE 471. This course is primarily for graduate engineering students, but is accessible to applied social science students if they have a special interest in the topic, particularly if they have an undergraduate engineering background. Students who are unsure of their preparation should consult with the instructor, who will help make a careful determination of whether students are likely to succeed in the course.

X. COURSE OUTLINE AND SCHEDULE OF TOPICS*

Date	Lecture Topics	Reading Assignments	Deliverable / Due Dates
01/10/24	Multimodal Transportation Safety, Security, and Emergency Management – An Overview	Slides provided on Blackboard	
01/17/24	Transportation Security Federal Agencies – Roles, Responsibilities and Policies	Slides provided on Blackboard	
01/24/24	Surface Transportation Security – Threats and Strategies, Case Studies Risk Management and Risk Mitigation Strategies	Slides provided on Blackboard	In class assignment
01/31/24	Bridge/Tunnel/Highway Infrastructure Vulnerability Assessment	Slides provided on Blackboard	Research Topic Selection Due
02/07/24	Transit Security – Threats and Strategies, Case Studies	Slides provided on Blackboard	In class assignment
02/14/24	Practices for the Protection of Transportation Infrastructure from Cyber Incidents	Slides provided on Blackboard	Research Topic Proposal Due
02/21/24	Aviation Security - Threats and Strategies, Case Studies	Slides provided on Blackboard	Quiz
02/28/24	Emergency Management Practices, Continuity of Operations (COOP), Case Studies	Slides provided on Blackboard	
03/06/24	Mid-Term Exam Freight and Maritime Transportation Security – Threats and Strategies, Case Studies	Slides provided on Blackboard	Mid-Term Exam

CE 582

Transportation System Security and Emergency Management

Date	Lecture Topics	Reading Assignments	Deliverable / Due Dates
03/13/24 Spring Recess - No Class			
03/20/24	Economic Impacts of Disruptions to the Supply Chain and Goods Movement System; Transportation and Economic Consequences of Terrorist Attacks, Prioritizing High-Value Transportation Choke Points	Slides provided on Blackboard	In class assignment
03/27/24	Field Trip**	Review the web site for the selected agency being visited Prepare questions	Field trip
04/03/24	Chemical, Radiological, Biological, Nuclear Threats and Countermeasures to the Transit System	Slides provided on Blackboard	Filed Trip Report Due
04/10/24	Regional Transportation Planning for Disasters, Emergencies, and Significant Events	Slides provided on Blackboard	In class assignment
04/17/24	Student research presentations Applying Military Situation Awareness and Technologies to Transportation Applications	Slides provided on Blackboard	Research Presentations –
04/24/24	Student research presentations Review and Wrap-Up	Slides provided in class	Research Presentations – Final Study Paper Due
05/01/24	Final Exam (2 hours)		Date and time of the final on USC Schedule of Classes at classes.usc.edu/ .

*The order of topics is subject to change.

**The field trip date will be determined during the semester pending agency's availability.

CE 582

Transportation System Security and Emergency Management

XI. GENERAL INFORMATION

Statement on Academic Conduct and Support Systems

<https://viterbischool.usc.edu/academic-integrity/>

Academic Integrity:

The University of Southern California is a learning community committed to developing successful scholars and researchers dedicated to the pursuit of knowledge and the dissemination of ideas. Academic misconduct, which includes any act of dishonesty in the production or submission of academic work, comprises the integrity of the person who commits the act and can impugn the perceived integrity of the entire university community. It stands in opposition to the university's mission to research, educate, and contribute productively to our community and the world.

All students are expected to submit assignments that represent their own original work, and that have been prepared specifically for the course or section for which they have been submitted. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s).

Other violations of academic integrity include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), collusion, knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.

The impact of academic dishonesty is far-reaching and is considered a serious offense against the university. All incidences of academic misconduct will be reported to the Office of Academic Integrity and could result in outcomes such as failure on the assignment, failure in the course, suspension, or even expulsion from the university.

For more information about academic integrity see the student handbook or the Office of Academic Integrity's website, and university policies on Research and Scholarship Misconduct. Please ask your instructor if you are unsure what constitutes unauthorized assistance on an exam or assignment, or what information requires citation and/or attribution.

Students and Disability Accommodations:

USC welcomes students with disabilities into all of the University's educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

Academic Conduct:

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with **the** discussion of plagiarism in SCampus in Part B, Section 11, "Behavior Violating University Standards" policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientific-misconduct.

CE 582

Transportation System Security and Emergency Management

Support Systems:

Counseling and Mental Health - (213) 740-9355 – 24/7 on call

studenthealth.usc.edu/counseling

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call

suicidepreventionlifeline.org

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press "0" after hours – 24/7 on call

studenthealth.usc.edu/sexual-assault

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) - (213) 740-5086 | Title IX – (213) 821-8298

equity.usc.edu, titleix.usc.edu

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298

usc-advocate.symplicity.com/care_report

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office of Equity and Diversity | Title IX for appropriate investigation, supportive measures, and response.

The Office of Disability Services and Programs - (213) 740-0776

dsp.usc.edu

Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

USC Campus Support and Intervention - (213) 821-4710

campussupport.usc.edu

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC - (213) 740-2101

diversity.usc.edu

CE 582

Transportation System Security and Emergency Management

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call

dps.usc.edu, emergency.usc.edu

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call

dps.usc.edu

Non-emergency assistance or information.

Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382 (HSC)

ombuds.usc.edu

A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.