

## Instructor

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Office Hour: Mason 3141A - Th 1:30-2:30pm, or by appointment

## Course Description

This course integrates information from various engineering and scientific disciplines in order to provide a rational basis for the design and analysis of structures considering multiple hazards, including earthquakes, hurricanes, tornadoes, and blast loading. As such, the course touches upon pertinent information from engineering seismology, geotechnical engineering, blast engineering, wind engineering, risk and reliability theory and architecture in addition to advanced topics related to the dynamic and impulsive response, analysis, design, and retrofit of structures. The focus of the course is on buildings, bridges, industrial facilities and other types of structures that may, in the event of a natural or man-made hazard, be allowed to respond in the inelastic range. The course emphasizes a theoretical understanding of the fundamental factors influencing and controlling the response of these structures, and on the development of effective, but simplified, design procedures capable of achieving specified performance goals.

## Prerequisites

There are no formal prerequisites for this course. Students are expected to have a background in structural analysis, mechanics, structural dynamics, and design in either reinforced concrete or steel.

## Course Conduct

The Georgia Tech Honor Code is the standard of conduct for this course. The Honor Code is available at <http://www.honor.gatech.edu/>.

## Website

The website for the course is <https://canvas.gatech.edu>. Students are expected to check regularly for announcements and are responsible for the material posted. Emails will be sent via Canvas to the email on record. It is the student's responsibility to check their email regularly.

## Homework

There is no graded homework in this course. Example homework problems with solutions are provided on Canvas. It is expected that students will review the example problems on their own time for reinforcement of course concepts and in preparation for the quizzes.

## Quizzes

There will be three quizzes given throughout the course corresponding to each of the three main hazards covered: earthquake, blast, and wind. The quizzes are focused on concepts and general understanding of course material. The use of notes, codebooks, and calculators varies for each quiz and students are expected to follow all instructions regarding quiz procedures.

Cheating off of another student's exam is unethical and unacceptable. Examples of cheating include, but are not limited to, bringing unauthorized material to exam, collaborating or sharing notes, talking during exam and using cellphones. Prior to the exam, all personal belongings will be placed in the front of the classroom. Please do not bring anything into the exam room which you are not comfortable leaving at the front. Cheating off of anyone else's work is a direct violation of the GT Academic Honor Code, and will be dealt with accordingly per Georgia Tech policy.

## Consulting Projects

In small groups, students will act as hazard engineering consultants and form a small company. Throughout the semester, the groups will be given various jobs that are typical of a consulting office. These jobs could include review of drawings for hazard criteria compliance, expert opinions, retrofit recommendations, peer-review of designs, company code development, and load calculations. All deliverables will be submitted in a professional format and should not be presented as hand-written student homework. Students should be aware that there is not always one correct solution to these projects nor will all the information be given to avoid assumptions. Students should focus on delivering thoughtful solutions that are based upon appropriate assumptions, mechanical principles, and rational design thinking.

Assessment of the projects will be based on instructor and peer evaluations.

## Grading

The grade will be determined from the following grading scheme:

- Quizzes (60%)
- Design Projects (40%)

# CEE 8813 - Multi-hazard Design & Analysis

## Tentative Schedule

Date	Topic	Notes
8/21	Course Introduction Structural Dynamics Review (SDOF)	
8/23	Structural Dynamics Review (MDOF) Elasticity and Inelasticity	
8/28	Earthquake: Introduction & EOM	
8/30	Earthquake: Numerical Methods	
9/4	Earthquake: Response Spectrum	1. Gravity Design Project Due
9/6	Earthquake: ASCE 7-16 Design Spectrum	
9/11	Group Project Time	LS out
9/13	Earthquake: Equivalent Force Procedure	
9/18	Earthquake: Drift and Irregularities	2. Analysis Methods Project Due
9/20	Earthquake: Design	
9/25	Earthquake: Design	
9/27	Group Project Time	LS out
10/2	<i>Earthquake Quiz</i>	
10/4	Concrete Design & Blast: Introduction	3a. EQ Design Due - Steel
10/9	Fall Break	No class
10/11	Blast: Parameters	3b. EQ Design Due - Concrete
10/16	Blast: Loads on Structures	
10/18	Blast: Loads on Structures	
10/23	Blast: Analysis Methods	4. Peer Review Project Due
10/25	Blast: Steel Design & Analysis	
10/30	Blast: Concrete & Masonry Design & Analysis	
11/1	Blast: CFRP Retrofits & Other Materials	5. Blast Analysis Project Due
11/6	Blast: Advanced Topics	
11/8	<i>Blast Quiz</i>	
11/13	Wind: Introduction	6. Blast Design Project Due
11/15	Wind: Codes & Standards	
11/20	Wind: Codes & Standards	7. Peer Review Project Due
11/22	Thanksgiving Break	No class
11/27	Wind: Codes & Standards	
11/29	<i>Wind Quiz</i>	
12/4	Group Project Time	
12/13	Projects due at beginning of exam period	8. Wind Loads Project Due