CEE 6541 - Earthquake Engineering

Instructor

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Teaching Assistants

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Course Description

This course integrates information from various engineering and scientific disciplines in order to provide a rational basis for the design of earthquake-resistant structures. As such, the course touches upon pertinent information from engineering seismology, geotechnical engineering, risk and reliability theory and architecture in addition to advanced topics related to the dynamic 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 major earthquake 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

Students are expected to have a background in structural analysis, mechanics, structural dynamics, and design in reinforced concrete and steel. A basic understanding of inelastic structural analysis is required. Courses such as CE6501, CE6510, and CE6521, CE6551, or their equivalent, satisfy this requirement.

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/.

Office of Disability Services

The Georgia Institute of Technology has policies regarding disability accommodation, which are administered through The Office of Disability Services. http://disabilityservices.gatech.edu/. For students with disabilities, please contact this Office to request classroom accommodations.

Website

The website for the course is https://t-square.gatech.edu. Students are expected to check regularly for announcements and are responsible for the material posted. Emails will be sent

via T-square to the email on record. It is the student's responsibility to check their email regularly.

Homework

Assignment of problems related to the lecture material will be made regularly. The problems may be theoretical, computational, or design-oriented. Please be concise and neat in submitting solutions. All students must turn in their own homework assignments. Discussion of the homework problems with other class members is allowed, copying is not. Homework will be checked for excessive similarities and will be given a zero for the assignment.

Assignments are due at the beginning of the class. Solutions for homework assignments denoted with an (*) will be posted immediately after class for exam preparation. No late homework will be accepted after the solutions are posted online. Late homework due to medical reasons will be considered with a doctor's note. Extensions for religious reasons or medical issues should be requested as soon as possible, prior to the homework being due.

Computer Programs

An important part of the course is solving computational problems. You can use Matlab or Mathcad for most of the assignments. A few assignments will require the use of Matlab. The use of Mathcad or Matlab will still require concise and professional submissions.

Exams

There will be two one and a half hour exams in the 5th and 10th week of classes covering the material from that portion of the course. The final exam will cover material from that portion of the course (approximately two-thirds) and cumulative material from the rest of the course (approximately one-third). Copies of relevant course material will provided online. During the exam, students are allowed to use printed copies of this material, which can be annotated with hand-written notes. Adding additional material to the course notes/code books is not permitted for use on the exam; this include homework assignments or other handwritten notes.

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.

Textbook

Although there is not an official textbook for this course, the Textbook by Chopra, Dynamics of Structures, will be used significantly throughout this course.

Code Books

Code books for the course include:

- ASCE 7-10
- ACI 318-11
- AISC 341-10, AISC 358-10, AISC 360-10

Grading

The grade will be determined from the following grading scheme:

- Homework (30%)
- Exams (2 at 20% each)
- Final (30%)

Grading is NOT based on a curve. Students can check all grades on T-square.

Tentative Schedule

Date	Topic	Due
1/12	Course Overview & Earthquake Engineering Introduction	
1/14	Review of Structural Dynamics, Part 1	
1/19	Seismology (*DesRoches*)	
1/21	Geotechnical Aspects (*DesRoches*)	
1/26	Review of Structural Dynamics, Part 2	
1/28	Excitations and EOM	
2/2	Time-stepping	HW #1 & 2
2/4	Dynamics Lab	
2/9	Exam 1: Seismology, Geotech & Structural Dynamics	
2/11	Elastic Response Spectrum (*DesRoches*)	
2/16	Elastic Design Spectrum	HW #3
2/18	Inelastic Behavior	
2/23	ASCE 7-10 Design Spectrum	
2/25	ASCE 7-10 Design Spectrum	
3/1	Multi-story Time-History Analysis	HW #4
3/3	Equivalent Lateral Force Procedure	
3/8	Story Drift	
3/10	Torsion/Irregular Structures	
3/15	Experimental Methods	HW #5
3/17	Exam 2: Earthquake Loads	
3/22	**Spring Break**	
3/24	**Spring Break**	
3/29	Steel Design - SMRF	
3/31	Steel Design - RBS	
4/5	Steel Design - CBF	
4/7	Steel Design - EBF	
4/12	Steel Design - BRBF	
4/14	Concrete Design - SMF	HW #6
4/19	Concrete Design - Shear Walls	
4/21	Concrete Design - Retrofits	
4/26	Energy Dissipation Methods	HW #7*
4/28	**Final Exam**	