

CEE 3051 – Introduction to Structural Engineering

Instructor

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Class: Monday and Wednesday (Time TBD)

Office Hours: By appointment

Course Description

This course introduces fundamental concepts in structural engineering: the science, art, and skill of designing various types of structures such that their behavior is as intended and they function safely throughout their lifetime. Through case studies of structures and failures, laboratory experiments, and lectures, students will understand how structures of all types (i.e., buildings, bridges, domes, dams, etc.) resist and transfer loads, compute the effects of the loads on the structural members, and determine the material and size of these members such that they are safe.

Course Objectives

During this course, the student will learn by actively participating in lectures and demonstrations, solving individual homework assignments, and by applying concepts to real world structures. After the student completes the course, they will be able to:

- Determine the behavior of structural systems subjected to gravity, lateral, dynamic, and other loads
- Represent three-dimensional structural systems as two-dimensional analysis models
- Compute the demand loads on members
- Design basic structural members made of commonly used materials
- Explain the force transfer mechanisms of the structure

Prerequisites

This course is intended for undergraduate students who have taken COE 3001: Deformable Bodies.

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>.

Everyone is encouraged to wear a mask based on their preference and assessment of personal risk.

Office of Disability Services

The Georgia Institute of Technology has policies regarding disability accommodations administered through The Office of Disability Services, <http://disabilityservices.gatech.edu> (including those related to COVID-19). Please contact this office to request accommodations.

Website

All course content including lectures, homework assignments, and grades will be published on Canvas (<https://canvas.gatech.edu>). **Communication abroad and updates regarding field trips will be communicated via Teams. It is required that students have access to data on their mobile device at all times abroad.**

Attendance and Participation

This course includes extensive lecture periods and field trips. Students are expected to attend all lectures and field trips. Participation is based on the following criteria: arriving to class/field trip location on time; paying attention during lectures; attentive watching and listening on field trips; respectful listening when the instructor or your peers are speaking; your ability to be fully engaged in your learning without texting, checking your phone or email, or participating in other digital distractions; your ability to stay awake, etc. If you are unable to meet the above criteria, the instructor will take away participation points throughout the semester. This will be noted in the Canvas comments section for documentation.

Homework

Homework problem sets will be posted on Canvas. Please be concise and neat when submitting solutions. All students must submit their own homework assignments. Discussion of the homework problems with other class members is encouraged. Utilizing other students' or prior years' homework to directly generate your assignment is prohibited. Excessive similarities between deliverables or deliverables from previous years will receive a zero grade on the homework assignment. All assignments shall be submitted electronically via Canvas. Late homework is accepted at a 25% markdown per day late up to two days. 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, medical issues, or any other Institute-approved absence should be requested as soon as possible before the homework is due.

Real World Structural Analysis Assignments

Field trips will be conducted with four structural analysis assignments. These assignments will utilize the information from instructor's lectures, your detailed observations, and at home critical thinking. It is recommended to take pictures of the site and of your observations.

Grading

The final grade will be determined from the following grading scheme:

- Homework: (40%)
- Real World Structural Analysis Assignments: (20%)
- Final Exam: (25%)
- Participation: (15%)

A \geq 90%; B \geq 80%; C \geq 70%; D \geq 60%; F < 60%

Textbooks

There is no official textbook for the course. Course notes, homework solutions, and additional course materials will be available on Canvas.

Tentative Schedule (subject to change)

| Date | Topic | Problem Set Due |
|-------|--|-----------------------|
| 05/11 | Introduction Course Syllabus Structural Drawings/Terminology Types of Structures and Structural Elements Loads and Load Paths/Tracing Reactions and Supports | |
| 05/13 | Structural Engineering Research and Codes Steel Construction “Stick-built”/Mass Timber Construction Beams Shear and Bending Stresses Steel and Wood Beam Design | Problem Set 1 |
| 05/18 | Structural Design Software Axial Members (Tension Members & Columns) Buckling Trusses Steel and Wood Column Design | Problem Set 2 |
| 05/20 | Construction Documents and Shop Drawings Concrete Construction Continuous Members Concrete Beam and Column Design | Problem Set 3 |
| 05/25 | Shareholder Coordination Lateral Forces and load paths Lateral force resisting systems Shallow foundations Deep Foundations | Problem Set 4 |
| 05/27 | Bridges Domes Structural Dynamics | Problem Set 5 |
| 06/01 | All Day Field Activity: Thames Tour, London Eye, Exchange House | |
| 06/02 | All Day Field Activity: St. Paul’s, Millenium Bridge, Tate Modern | Analysis Assignment 1 |
| 06/10 | Field Activity: Three Bridges Boar Cruise and Island | Analysis Assignment 2 |
| 06/11 | Wrap – up/review lecture | |
| 06/23 | Final Exam | |