

## CEE 4550 – Structural Analysis II, Fall 2014

MWF 2:05 – 2:55 pm, Mason 1133

**Course Objective:** This course is intended to teach undergraduates and first year graduate students more advanced structural analysis techniques for indeterminate structures using classical and matrix/computer methods of solution. The course builds on materials presented in CEE 3055 – Structural Analysis. Students will demonstrate an ability to solve two- and three-dimensional trusses and frames using a variety of solution methods including computer solutions.

**Prerequisites:** CEE 3055 – Structural Analysis.

MATLAB experience is strongly recommended (CS 1371 - Computing for Engineers). If you had little experience before, here are some useful tutorial materials (please go through the interactive tutorial in first two weeks of the semester):

[http://www.mathworks.com/academia/student\\_center/tutorials/launchpad.html](http://www.mathworks.com/academia/student_center/tutorials/launchpad.html).

**Texts:** *Fundamentals of Structural Analysis*, 4<sup>th</sup> Edition. Kenneth M. Leet, Chia-Ming Uang, Anne Gilbert. McGraw Hill, ISBN: 978-0073401096.

*Matrix Analysis of Structures*, 2<sup>nd</sup> Edition. Aslam Kassimali. Cengage Learning, ISBN: 978-1111426200.

**Instructor:** Yang Wang, Ph.D.  
Associate Professor  
School of Civil and Environmental Engineering  
Tel: 404-894-1851      Email: [yang.wang@ce.gatech.edu](mailto:yang.wang@ce.gatech.edu)  
Office Hour: MW 3 – 4pm, or by email appointment (Mason 4160)

**Course Assistant:** Chunhee Cho ([ccho37@gatech.edu](mailto:ccho37@gatech.edu))  
Office Hours: TTh 11am -12pm (Mason 2120)

**Grader:** Xinjun Dong ([xinjundong@gatech.edu](mailto:xinjundong@gatech.edu))

**Grading-A:** Homework – including manual and coding assignments (15%)  
Three in-class exams (16.67% each)  
Final exam (35%)  
Class attendance (3% extra credit)

**Grading-B:** Manual assignments (15%)  
Coding assignments (10%)  
Three in-class exams (16.67% each)  
Final exam (25%)  
Class attendance (3% extra credit)

There will be homework due weekly except for weeks with exams, including the week preceding the final exam. A higher score between following two approaches will be used to give your letter grade.

### **In-class Exam Schedule (Tentative)**

1. September 19 (Fri)
2. October 24 (Fri)
3. November 24 (Mon)

**Final Exam Schedule:** December 8 (Mon) 11:30am – 2:25pm (Period 2 per Registrar’s Office)

### **Course Policy:**

1. The Institute mandates you to **check emails on each school day**: *“All students will have an e-mail account through the Georgia Institute of Technology that will be their official point of contact, and they are expected to check this account each school day.”* (<http://www.catalog.gatech.edu/rules/3a.php>) Please do so since email is the only way for the instructor to contact you.
2. Piazza will be used to post electronic materials for this course, and for sharing questions and answers (<https://piazza.com/gatech/fall2014/cee4550/home>).
3. If you **miss a class**, it is your responsibility to keep abreast of latest material and any announcements by asking fellow students.
4. **Laptop or cell phone usage is not allowed** in the class.
5. In this class, you are allowed to work in groups on all homework and out of class assignments, but **any work you turn in must be completed by yourself**. Generally what this means is: 1) try the problem on your own, 2) if necessary ask for help/suggestions, 3) go back on your own and implement the suggestions.
6. You should strive to turn your assignments in on time. The **late homework policy** uses a time-credit system. You are allowed up to SIX "late days" over the course of the semester. You may use them whenever you like, although no more than two late days per homework. Once you have used your allotted days, additional late assignments will not be accepted.

Note that you cannot use less than a day (meaning a calendar day, **NOT a “School Day” or a “Business Day”**); for example, if an assignment is one hour late it will be considered a full day.

7. If you miss an exam/quiz without a documented excuse<sup>1</sup>, you get zero points on that exam/quiz. In exceptional circumstances, **makeup exams or quizzes** may be given after

---

<sup>1</sup> A documented excuse includes an original document indicating the excuse (such as hospitalization, family emergencies, Institute activities, etc.), as well as a possible note from the Dean of Students that verifies the document.

the normal exam time. The makeups may be more difficult than the normal exams, due to the extra time you have compared with other students.

8. It is your responsibility to check possible **conflict in your final exams**, and contact the instructors to resolve the conflicts no later than 2 weeks before the Monday of the exam week: <http://www.registrar.gatech.edu/home/examguide.php>.
9. All in-class exams and the final exam are going to be **closed-book** while allowing cumulative cheat sheets. You can use a one-page double-sided cheat sheet in Exam 1, two pages in Exam 2, three pages in Exam 3, and four pages in the final exam. These exams are meant to be your own work.
10. Compliance with GATech's **Academic Honor Code** is expected (<http://www.honor.gatech.edu>). Plagiarizing is defined by *Webster's* as "to steal and pass off (the ideas or words of another) as one's own: use (another's production) without crediting the source." If caught plagiarizing, you will be dealt with according to the GT Academic Honor Code.

## CEE 4550 – Structural Analysis II

1. Introduction and Basic Review
  - 1.1 Determinacy and stability of 2D and 3D trusses and frames (Leet §4.7, §5.7).
  - 1.2 Supports and connections
  - 1.3 Relationships between load, shear, moment and curvature (Leet §5.1 – §5.5)
  - 1.4 Deformed shapes (Leet §5.6)
  - 1.5 Review of 3D Statics
2. Review of the flexibility (superposition) method and extension to 3D structures
  - 2.1 Review of unit load method (virtual work)
  - 2.2 Combined axial, bending, shear, and torsional effects (2D and 3D structures)
  - 2.3 Review of superposition method
  - 2.4 Maxwell – Betti's law
  - 2.5 Space truss and space frame analysis
3. Slope deflection & moment distribution
  - 3.1 Review of slope deflection
  - 3.2 Slope deflection with sidesway
  - 3.3 Moment distribution without sidesway
4. Plane trusses
  - 4.1 Global and local coordinate systems
  - 4.2 Degrees of freedom

- 4.3 Member stiffness relations in the local coordinate system
- 4.4 Coordinate transformations
- 4.5 Member stiffness relations in the global coordinate system
- 4.6 Structure stiffness relations
  
- 5. Plane frames
  - 5.1 Analytical model
  - 5.2 Member stiffness relations in the local coordinate system
  - 5.3 Coordinate transformations
  - 5.4 Member stiffness relations in the global coordinate system
  - 5.5 Structure stiffness relations
  
- 6. Influence lines
  - 6.1 Determinate structures
  - 6.2 Muller-Breslau principle
  - 6.3 Indeterminate beams & frames
  - 6.4 Pattern loadings
  
- 7. Approximate analysis
  - 7.1 Gravity loads on beams and frames
  - 7.2 Lateral loads on frames: portal and cantilever methods

---

Disclaimer: When appropriate or necessary, the instructors reserve the right to adjust, amend, or otherwise modify the information presented on this syllabus.