CEE 4550 – Structural Analysis II, Fall 2018

MW 4:30pm - 5:45 pm, Mason 5134

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 stiffness and flexibility methods.

Prerequisites: CEE 3055 – Structural Analysis.

MATLAB experience is strongly recommended (CS 1371 - Computing for Engineers). If you had little experience before, there are plenty of tutorial materials online (**please go through the basic tutorials in first two weeks of the semester**): http://www.mathworks.com/help/matlab/getting-started-with-matlab.html?s_cid=learn_doc.

Texts: *Fundamentals of Structural Analysis*, 4th Edition. Kenneth M. Leet, Chia-Ming Uang, Anne Gilbert. McGraw Hill, ISBN: 978-0073401096.
Matrix Analysis of Structures, 2nd Edition. Aslam Kassimali. Cengage Learning, ISBN: 978-1111426200.

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Office Hours: TueWed 1–2pm (Mason 1201A), or email for appointment
Grader: Dan Li (dli323@gatech.edu)

Grading-A: Homework – including manual and coding assignments (15%)
Midterm (40%)
Final exam (45%)

Grading-B: Manual assignments (15%)
Coding assignments (10%)
Midterm (35%)
Final exam (40%)

There will be homework due weekly, including the Final Instructional Class Days. A higher score between the two approaches will be used to give your letter grade according to the following scale:

A	90-100%
B	80-89%
C	70-79%
D	60-69%

F 0-59%

Midterm Schedule (Tentative)

October 15 (Mon), October 17 (Wed)

Final Exam Schedule: December 7 (Fri) 2:40pm - 5:30pm (per Registrar's Office http://www.registrar.gatech.edu/students/exams.php)

Course Policy:

1. The Institute mandates you to **check emails on each school day**: "*All enrolled students have an e-mail account provided by Georgia Tech. This account is a student's official point of contact with the Institute, and she/he is expected to check it each school day*." (http://catalog.gatech.edu/rules/3/) Please do so since email is the only way for the instructor to contact you.

2. **Laptop or cell phone usage is not allowed** in the class or in exams. The only exception for in-class laptop usage is when you need to access an electronic version of the textbook.

3. 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.

4. 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.

5. If you miss an exam without a documented excuse[1], you get zero points on that exam. For planning purposes, please provide me with written notice of your upcoming absence at least two weeks before the event, and ideally within the first two weeks of class. In these exceptional circumstances, **makeup exams or quizzes** may be given after 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.

6. 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 Thursday of the Final Examination Period.

[1] A documented excuse includes an original document indicating the excuse (such as hospitalization, family emergencies, Institute activities, etc.). Please see http://catalog.gatech.edu/rules/4/ for more information about receiving official notice from the Registrar on the nature and timing of your upcoming Institute-approved absence.

7. 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 midterm, two pages in the final exam. These exams are meant to be your own work.

8. Strict 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."* Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

CEE 4550 – Structural Analysis II

1. Basic review
   1.1. Classification of framed structures (Kass §1.1 – §1.5)
   1.2. Determinacy and stability of 2D and 3D trusses and frames (Leet §4.7, §5.7)
   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
   1.6. Review of unit load method (virtual work) (Leet §10.5, §10.6)
   1.7. Combined axial, bending, shear, and torsional effects (Kass §8.3)

2. Direct stiffness method of plane trusses
   2.1. Global and local coordinate systems (Kass §3.1)
   2.2. Degrees of freedom (Kass §3.2)
   2.3. Member stiffness relations in the local coordinate system (Kass §3.3)
   2.4. Coordinate transformations (Kass §3.5)
   2.5. Member stiffness relations in the global coordinate system (Kass §3.6)
   2.6. Structure stiffness relations (Kass §3.7)

3. Slope deflection & moment distribution
   3.1. Review of slope deflection (Leet §12.1 – §12.4)
   3.2. Slope deflection with sidesway (Leet §12.5)
   3.3. Moment distribution without sidesway (Leet §13.1 – §13.5)

4. Direct stiffness method of plane frames – a brief introduction (Kass §6)

5. Flexibility (superposition) method and extension to 3D structures
   5.1. Review of superposition method (Leet §11)
   5.2. Maxwell – Betti's law (Leet §10.9)

6. Influence lines
   6.1. Review of determinate structures and Muller-Breslau principle (Leet §8.1 – §8.4)
   6.2. Indeterminate beams & frames (Leet §14.1 – §14.4)
   6.3. Pattern loadings (Leet §14.5)

7. Symmetric structures
   7.1. Symmetric structures
   7.2. Symmetric and antisymmetric components of loadings
   7.3. Behavior of symmetric structures under symmetric and antisymmetric loadings
   7.4. Procedure for analysis of symmetric structures

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