UTTyler COLLEGE OF ENGINEERING

CENG 3325 – Structural Analysis

Dr. Minhyeok Ko **Spring 2026**
Dept. of Civil and Construction Engineering and Management
RBS 1011, (903) 565-5711 mko@uttyler.edu
Office Hours: Tu/Th 9:30-11:00 AM or by appointment

Course Description:

This course is aimed at introducing classical methods of structural analysis to provide students with necessary technical tools and knowledge for analyzing structures and structural elements. The course will provide a fundamental understanding about structural loads and the transmission of the loads throughout the structure, introduce types of structural systems and various structural analysis methods, and provide physical understanding of structural analysis concepts and theories.

Learning Objective:

1. Develop an organized approach to solving structural analysis and design problems.
2. Understand types of structures (beams, frames and trusses) and structural elements
3. Understand loads and load paths within structures
4. Analyze statically determinate and indeterminate structures to determine their members internal load effects (axial, shear, moment, deflections) and external reactions using:
    i. Equilibrium.
    ii. Virtual work.
    iii. Force method.
    iv. Displacement methods.
5. Display and determine the worst-case member internal load effects and external reactions using:
    i. Shear and moment functions.
    ii. Shear and moment diagrams.
    iii. Influence lines (for determinate structures only).
    iv. Deflected shapes.
6. Use spreadsheets and math solving programs as a tool to perform the mathematical operations required in structural analysis.
7. Use a finite element analysis program to analyze trusses, beams, and frames.

Course Time and Place:

Tu/Th 8:00 AM – 9:20 AM in RBN 3039

Credit Hours and Work Expectations:

This is a 3-credit-hour course. According to UT Tyler policy, students should expect around 3 hours per week of time spent on direct instruction (instructor content and Canvas activities, for example) in addition to 6 hours of homework (reading and assignment preparation, for example) to receive a grade of (C) average.

Teaching Assistant:

TBA

Course Website:
Canvas will be used to manage the course material for the semester. There you will find homework assignments, HW solutions, handouts, and other material pertaining to the class. Collected homework will be graded either for points or completion only. **Please check there regularly**.

Prerequisites/Corequisite:
CENG/MENG 3306: Mechanics of Materials

Main Textbook:
Any structural analysis textbook. The following book is particularly recommended:

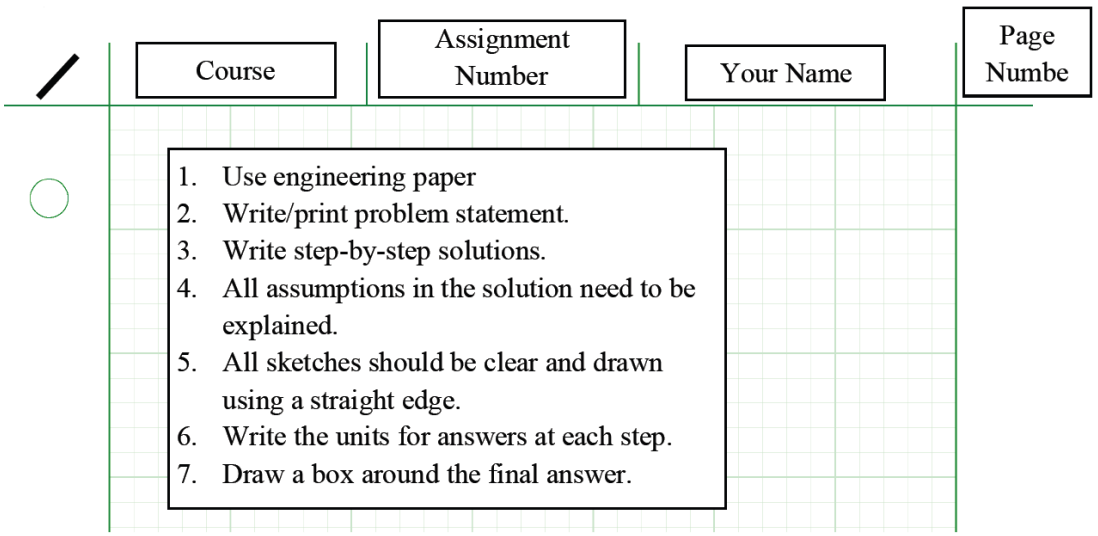
- *Structural Analysis,* 10th Edition, R. C. Hibbeler, Pearson Prentice Hall, Upper Saddle River, NJ, 2012. ISBN-13: 978-0-13-461067-2

Homework Policy:

- *Collaboration*: Students are encouraged to study in groups; however, all homework assignments must be completed and submitted individually.
- *Submission*: Homework will be assigned regularly and submitted as a single PDF file through Canvas by **11:59 pm on the due date**. Solutions may be scanned or created using an iPad/Tablet PC. Please make sure you upload your work correctly.
- *Late Work*: **No late homework will be accepted** except under unusual circumstances. **Do not wait until the deadline** to submit your work. If you experience technical issues when uploading your homework, email me before the deadline with your work attached.
- *Grading*: Homework will not be graded in the traditional sense. Complete solutions will be posted on Canvas after the due date so that you may review your work after submission**. Full credit will be awarded only if the homework is complete, submitted on time, and follows the required homework format. Homework that is incomplete or does not follow the homework guidelines will receive a score of 0. No partial credit will be given; homework is graded on a 100% or 0% basis**. All solutions must be presented in a clear, logical, and methodical manner. You must follow the "Required Format for Homeworks." Solutions that are not clearly presented will not receive credit.
- *Lowest Score*: Your lowest homework grade will be dropped.

Required Format for Homeworks:
Homework must follow the required format. If not follow, the submitted homework will not be graded, and its grade will be automatically zero.

- Submitted on **engineering grid paper** (**letter size 8 ½×11"**).
- Problem statements included.
- Numerical results must be accompanied by clear explanations and solution steps. Work must be neat and legible.
- All problems should include problem number, a diagram of the problem (draw all free body diagrams when necessary).
- Use a straight edge to draw figures.
- Put only one problem per page. Do not start new problem in the middle of a page.
- When required to produce a graph, use a computer program such as excel or Matlab to generate the plot. Do not draw it by hand!



Exams & Quizzes Policy:

- *Quizzes*: **Multiple pop-up quizzes will be given throughout the semester**. In general, quizzes will be administered during the week following the due date of each homework assignment. **Quiz questions will be adapted from the homework problems**. Students must bring an **NCEES-approved calculator to every class**.
- *Exams*: There will be **two midterms** and **one comprehensive final** exam. All exams are closed book/closed notes.
- *Retake/Make-up Exams/quizzes*: **Retake/Make-up exams/quizzes are not normally offered**. Exceptions will be made only for serious, documented circumstances (e.g., official UT Tyler travel, illness, accident, childbirth, passing of an immediate family member, jury duty, court appearance). Events that are pre-schedulable (e.g., traffic, weddings, car service, etc) are not considered valid reasons. Job interviews may be considered with proper documentation and early notice. In case of an emergency during exam day, please notify the instructor immediately (via email).
- *Grades*: Final grades are based on total points earned and are not subject to a curve. Your grade depends only on your performance, not on others.

Attendance Policy:

Attendance is mandatory for this course. Although attendance is not directly reflected in the final grade, **students are fully responsible for any material, announcements, or in-class activities missed due to absence**. Unexcused absences do not entitle students to make up missed content.

Calculator Policy:

Only NCEES approved calculators will be permitted during tests and your test will be collected and your grade will be zero if you are using a non-approved calculator. The approved calculators (Aug. 2025) include the following:

- Casio: **All fx-115** and **fx-991 models** (Any Casio calculator must have "fx-115" or "fx-991" in its model name.)
- Hewlett Packard: The **HP 33s** and **HP 35s** models, but no others
- Texas Instruments: **All TI-30X** and **TI-36X models** (Any Texas Instruments calculator must have "TI-30X" or "TI-36X" in its model name.)

Exams schedule:

There will be three midterm examinations (held during the scheduled class time) and one final examination. The exams are TENTATIVELY scheduled for:

- Midterm1: **2/17/2026 (Tu) In-class**
- Midterm2: **3/31/2026 (Tu) In-class**
- Final: **TBA**

Important Artificial Intelligence (AI) Information :

AI is not permitted in this course at all. I expect all the work students submit for this course to be their own. I have carefully designed all assignments and class activities to support your learning. Doing your own work, without artificial intelligence assistance, is best for your efforts in mastering course learning objectives. For this course, I expressly forbid using ChatGPT or any other artificial intelligence (AI) tools for any stages of the work process, including brainstorming. Deviations from these guidelines will be considered a violation of UT Tyler's Honor Code and academic honesty values.

Assessment Policy:

Students' performance will be assessed on their ability to explain the course concepts and use the presented techniques. The final grades will be computed based on the following weighting scheme:

- Homework 10 %
- Quizzes 15 %
  (+Syllabus Quiz +1%)
- Midterm 1 20 %
- Midterm 2 20 %
- Final Exam 35 %

Note

In grading the homework, assignments, and exams, etc., **no credit will be given to methods not covered in this class**, although these methods, tables, formulae may appear in the textbook. Errors or outdated material in the textbook should not be the reason for claiming full credit on work done.

Course Grades:

A	$90 \le G \le 100$	B	$80 \le G < 90$	C	$70 \le G < 80$
D	$60 \le G < 70$	F	$G < 60$		

Additional Instruction:

CENG 3325 is rigorous and fast-paced. Do not fall behind, or you may fail to catch up. If you have difficulty understanding a lesson or completing a problem set, see your instructor. If you miss a class, you are responsible for the material; get the notes from another student or schedule time to meet with your instructor. If you need additional instruction, feel free to drop by my office during office hours. Before coming to the office hours, consider specific questions and try to send them to your instructor ahead of time. Do not come to the office hours with vague questions or without having first attempted to solve the assigned problems.

Course Topics/Schedule (Subject to change):

1. **Introduction**
   Overview of the course, Introduction to design process, basic types of structures, structural elements, and the applied loads — *Chapter 1*

2. **Analysis of Statically Determinate Structures**
   Free-body diagrams, determinacy of structures, idealization of structures, and analysis of statically determinate and planar structures — *Chapter 2*

3. **Analysis of Statically Determinate Trusses**
   Determinacy and stability of trusses, types of trusses, methods of joints, methods of sections — *Chapter 3*

4. **Internal Loadings Developed in Structural Members**
   Shear and moment diagrams, principle of superposition — *Chapter 4*

5. **Deflections of Beams and Trusses**
   Elastic beam theory, double integration, — *Chapter 8*

6. **Deflections using Energy Methods**
   Application of energy methods to solve problems involving slope and deflection — *Chapter 9*

7. **Analysis of Statically Indeterminate Structures by the Force Method**
   Application of the force or flexibility method to analyze statically indeterminate trusses, beams, and frames — *Chapter 10*

8. **Influence Lines for Structures**
   Construction of influence lines for concentrated and distributed loads, applications for floor girders and bridge trusses — *Chapter 6&10*

9. **Displacement Method of Analysis through Slope-Deflection Equations**
   Introduction to displacement-based method of analysis of structures; analysis of statically indeterminate beams and frames using general equations of slope and deflection — *Chapter 11*

UT Tyler Honor Code:
Every member of the UT Tyler community joins together to embrace: Honor and Integrity that will not allow me to lie, cheat, or steal, nor to accept the actions of those who do.

Student Standards of Academic Conduct:
Disciplinary proceedings may be initiated against any student who engages in scholastic dishonesty, including, but not limited to, cheating, plagiarism, collusion, the submission for credit of any work or

materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.

(i) "Cheating" includes, but is not limited to:
   a. copying from another student's test paper;
   b. using, during a test, materials not authorized by the person giving the test;
   c. failure to comply with instructions given by the person administering the test;
   d. possession during a test of materials which are not authorized by the person giving the test, such as class notes or specifically designed "crib notes". The presence of textbooks constitutes a violation if they have been specifically prohibited by the person administering the test;
   e. using, buying, stealing, transporting, or soliciting in whole or part the contents of an un-administered test, test key, homework solution, or computer program;
   f. collaborating with or seeking aid from another student during a test or other assignment without authority;
   g. discussing the contents of an examination with another student who will take the examination;
   h. divulging the contents of an examination, for the purpose of preserving questions for use by another, when the instructors has designated that the examination is not to be removed from the examination room or not to be returned or to be kept by the student;
   i. substituting for another person, or permitting another person to substitute for oneself to take a course, a test, or any course-related assignment;
   j. paying or offering money or other valuable thing to, or coercing another person to obtain an un-administered test, test key, homework solution, or computer program or information about an un-administered test, test key, home solution or computer program;
   k. falsifying research data, laboratory reports, and/or other academic work offered for credit;
   l. taking, keeping, misplacing, or damaging the property of The University of Texas at Tyler, or of another, if the student knows or reasonably should know that an unfair academic advantage would be gained by such conduct; and
   m. misrepresenting facts, including providing false grades or resumes, for the purpose of obtaining an academic or financial benefit or injuring another student academically or financially.

(ii) "Plagiarism" includes, but is not limited to, the appropriation, buying, receiving as a gift, or obtaining by any means another's work and the submission of it as one's own academic work offered for credit.

(iii) "Collusion" includes, but is not limited to, the unauthorized collaboration with another person in preparing academic assignments offered for credit or collaboration with another person to commit a violation of any section of the rules on scholastic dishonesty.

(iv) All written work that is submitted will be subject to review by plagiarism software.

UT Tyler Resources for Students:

- UT Tyler Writing Center (903.565.5995), writingcenter@uttyler.edu
- UT Tyler Tutoring Center (903.565.5964), tutoring@uttyler.edu
- The Mathematics Learning Center, RBN 4021, this is the open access computer lab for math students, with tutors on duty to assist students who are enrolled in early-career courses.
- UT Tyler Counseling Center (903.566.7254)
- **Campus Assessment, Response, and Education (CARE) Team**, The CARE Team engages in proactive and collaborative approaches to identify, assess, and mitigate risks associated with students exhibiting concerning behaviors, or facing hardships. By partnering with members of the campus community, the CARE Team strives to promote an individual student's wellbeing and success. https://www.uttyler.edu/offices/student-success/dean-of-students/care-team/

Students Rights and Responsibilities:
To know and understand the policies that affect your rights and responsibilities as a student at UT Tyler, please follow this link: http://www.uttyler.edu/wellness/StudentRightsandResponsibilities.html

Grade Replacement / Forgiveness and Census Date Polices:
Students repeating a course for grade forgiveness (grade replacement) must file a Grade Replacement Contract with the Enrollment Services Center (ADM 230) on or before the Census Date of the semester in which the course will be repeated. Grade Replacement Contracts are available in the Enrollment Services Center or at http://www.uttyler.edu/registrar. Each semester's Census Date can be found on the Contract itself, on the Academic Calendar, or in the information pamphlets published each semester by the Office of the Registrar. Failure to file a Grade Replacement Contract will result in both the original and repeated grade being used to calculate your overall grade point average. Undergraduates are eligible to exercise grade replacement for only three course repeats during their career at UT Tyler; graduates are eligible for two grade replacements. Full policy details are printed on each Grade Replacement Contract.

The Census Date is the deadline for many forms and enrollment actions that students need to be aware of. These include:

- Submitting Grade Replacement Contracts, Transient Forms, requests to withhold directory information, approvals for taking courses as Audit, Pass/Fail or Credit/No Credit.
- Receiving 100% refunds for partial withdrawals. (There is no refund for these after the Census Date)
- Schedule adjustments (section changes, adding a new class, dropping without a "W" grade)
- Being reinstated or re-enrolled in classes after being dropped for non-payment
- Completing the process for tuition exemptions or waivers through Financial Aid

State-Mandated Course Drop Policy:
Texas law prohibits a student who began college for the first time in Fall 2007 or thereafter from dropping more than six courses during their entire undergraduate career. This includes courses dropped at another 2-year or 4-year Texas public college or university. For purposes of this rule, a dropped course is any course that is dropped after the census date (See Academic Calendar for the specific date).
Exceptions to the 6-drop rule may be found in the catalog. Petitions for exemptions must be submitted to the Enrollment Services Center and must be accompanied by documentation of the extenuating circumstance. Please contact the Enrollment Services Center if you have any questions.

Disability/Accessibility Services:
In accordance with Section 504 of the Rehabilitation Act, Americans with Disabilities Act (ADA), and the ADA Amendments Act (ADAAA), the University of Tyler at Texas offers accommodations to students with learning, physical and/or psychological disabilities. If you have a disability, including non-visible a diagnosis such as a learning disorder, chronic illness, TBI, PTSD, ADHD, or you have a history of modifications or accommodations in a previous educational environment, you are encouraged to visit: "https://hood.accessiblelearning.com/UTTyler" and fill out the New Student application.

The **Student Accessibility and Resources (SAR) office** will contact you when your application has been submitted and an appointment with an Accessibility Case Manager. For more information, including filling out an application for services, please visit the SAR webpage at "http://www.uttyler.edu/disabilityservices", the SAR office located in the University Center, # 3150 or call 903.566.7079.

Student Absence due to Religious Observance:
Students who anticipate being absent from class due to a religious observance are requested to inform the instructor of such absences by the second-class meeting of the semester.

Student Absence for University-Sponsored Events and Activities:
If you intend to be absent for a university-sponsored event or activity, you (or the event sponsor) must notify the instructor at least two weeks prior to the date of the planned absence. At that time the instructor will set a date and time when make-up assignments will be completed.

Social Security and FERPA Statement:
It is the policy of The University of Texas at Tyler to protect the confidential nature of social security numbers. The University has changed its computer programming so that all students have an identification number. The electronic transmission of grades (e.g., via e-mail) risks violation of the Family Educational Rights and Privacy Act; grades will not be transmitted electronically.