UTTyler COLLEGE OF ENGINEERING

CENG 3334 – Civil engineering Materials, Codes and Specifications

Dr. Minhyeok Ko **Fall 2025**
Dept. of Civil and Construction Engineering and Management
RBS 1011, (903) 565-5711 mko@uttyler.edu

Course Description:

Physical properties of typical construction materials will be investigated including steel, Portland cement concrete, wood, and bituminous asphalt; classification of aggregates, concrete mix design, and field control and adjustment. Application of model building codes to commercial and industrial structures; nonstructural and structural plan review; fire codes, inspection techniques.

Learning Objective:

By the end of this course, students should successfully be able to:

(1) Explain the properties of materials commonly used in civil engineering.
(2) Explain the fabrication or method of manufacture of civil engineering materials.
(3) Explain and apply the testing methods commonly used on civil engineering materials.
(4) Explain and apply the standards covering the manufacture of civil engineering materials and the testing methods commonly used on these materials.
(5) Explain and apply codes, standards and specifications commonly used in civil engineering.
(6) Expose the students to the requirement for written presentation of their work.
(7) Conduct experiments on civil engineering materials according to the appropriate laboratory procedures.

Course Time and Place:

Lectures

- Mo/We 12:20 PM – 1:15 PM in RBS 2019

Laboratory

- (Section 001L) Mo 2:30 PM – 5:15 PM in RBS 1027
- (Section 002L) We 2:30 PM – 5:15 PM in RBS 1027

Office Hours:

- Mo 1:15 PM – 2:15 PM
- Th 9:00 AM – 10:30 AM
- Or by appointment

Teaching Assistant:

TBA

Course Website:

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

Prerequisites/Corequisite:

CENG 3306 or MENG 3306: Mechanics of Materials

Main Textbook:
Civil Engineering Materials, 2nd Edition, by Shan Somayaji

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.
- *Late Work*: Late submissions will incur a 20% deduction. Assignments will not be accepted more than 24 hours after the deadline.
- *Format*: Homework must follow the required format:
  - Submitted on engineering paper (or digital equivalent).
  - Problem statements included.
  - Numerical results must be accompanied by clear explanations and solution steps.
  - Work must be neat and legible; unclear or disorganized work may receive reduced or no credit.
- *Lowest Score*: Your lowest homework grade will be dropped.

Exams Policy:

- *Exams*: There will be two midterms and one comprehensive final examination. All exams are closed book/closed notes.
- *Make-up Exams*: Make-up exams 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.

Calculator Policy:
Only NCEES approved calculators will be permitted during tests and your test will be collected and your grade will be a 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 two midterm examinations (held during the scheduled class time) and one final examination. The exams are TENITATIVELY scheduled for:

- Midterm 1: **10/13/2025**
- Midterm 2: **11/17/2025**
- Final: **TBD**

Laboratory Policy:
There will be a series of labs completed during the semester. There are two sections of lab. You must attend the lab section you are registered for because we will be working in groups. At the first lab, we will go through proper safety training. You will be required to sign a student safety contract prior to starting the first week's lab. You will also need to complete an Environmental Health and Safety (EHS) quiz that will be administered through Canvas. You must score a minimum of 70% on the quiz. You will need to bring a print out of the final page of your safety quiz showing you achieved the minimum required score before you will be allowed to participate in week 2 lab. Everyone is required to abide by the safety contract during the semester. Failure to follow proper procedures during a lab will result in a zero for that particular lab assignment.

For each lab session - be sure to review the handout and complete all required work prior to coming to lab. This will help you to prepare for the experiment and help to make the sessions run smoother. If necessary, a quiz will be given at the beginning of the lab which covers the experiment for the day.

You will work in groups of 3 or 4 to complete each lab. The instructor will assign the groups. Each group will be required to turn in one report for the entire group. One person from each group must upload the report to Canvas. The format for the report is provided at the end of this syllabus. You are encouraging anyone to visit the writing center as they can provide excellent feedback and help you with your writing.

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

- Attendance 10 %
- Homework 15 %
- Midterm1 15 %
- Midterm2 15 %
- Final Exam 25 %
- Labs 20%

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	$G < 60$		

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/

Collection of Student Work:
Throughout the semester I *may collect* student work (best, average, and worst) for the ABET course and outcomes notebooks. This will require me to make a copy of your work, keep your original and return a copy of the graded work to you. I will not draw attention as to what level of work you accomplished.

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.

Required Format for Homeworks:

Page #__ of x pages total. (Place on all pages of the problem set)

Engineering Paper Required

	CMGT4313 Assignment # (on first page only)	Date Due: DD MMM YY (on first page only)	Name (on all pages)	1/x

○ **GIVEN:** Write a brief description of the information given in the problem statement.

FIND: Indicate the information you are to find for this problem. When you finish the problem, check this line to make sure you found all the things you were supposed to find.

○ **SOL'N:** Indicates where the solution starts. Good solutions are neat and clearly written, reference equation numbers where necessary, and include notes of explanation. Drawings are neat and contain clear labels and dimensions.

Put only one problem per page. Do not start a new problem in the middle of a page.

Sloppy work or work which does not follow this format may result in a point cut.

Use parenthetical documentation to indicate where you received assistance or information from others. For example:

(Helpful, I.M.,'20 instructed me to check the slab in shear, not just bending and where to find the shear equation in the ACI 318-19.)

○ "XXXXXXX ANS" indicates your answer and the end of the problem. This should match the FIND line from above.

GENG 3334 General Requirements for Lab Session:

Report

A laboratory report is required for each experiment performed. Only one lab report is required per group for most labs. There may however be certain labs that require each person to submit their own work. Due dates for each lab will be posted. Each group will need to upload the report to canvas. The report should be in the following format:

- **Cover Page**: Laboratory Title, Course Number (CENG 3334), Your Names and Group Number. Each person in the group signs the cover page indicting that they have read the report and approve of the contents contained within.
- **Objective**: Purpose of the experiment should be explained in a few sentences.
- **Procedure**: Include a summarized procedure of the steps you took to complete this lab. Numbered list is preferred.
- **Results and Discussion**: Present tabulated raw data (data sheets are provided with the standard laboratory procedure), relevant calculations, and required plots. BE SURE TO USE CAPTIONS FOR FIGURES, TABLES AND GRAPHS! Refer to the figures, graphs and tables by number in the text of the discussion. Partial credit can only be assigned if you present your work in a logical manner. Neatly show your work and attach a page of sample calculations.
  Try to have a good understanding of each experiment. Analyze your results. Identify probable sources of error that may have occurred while you performed the laboratory and explain how these errors might affect your results (final value will increase or decrease). DISCUSS!! For example, what trends do you notice in the data? Do the results make sense? Are they what you expected? If so why? If not, why not? Some labs will have more data than others to discuss. Be sure to give a thorough discussion of your results.
- **Conclusions**: Summarize your results. Relate what you have learned from class about materials, codes and specs to what you have learned from performing this lab. Explain that how this experiment is useful to solve the practical civil engineering problems.
- **Team Contributions**: The contributions of each team member should be stated in this section. List what portions of the report each person contributed towards and how much time each person spent. It is okay to have multiple people working on any part.

Grading

- Participation in Lab and Cleanup: 50 %
- Report: 50 %
  a. Objective 5 %
  b. Procedure 10 %
  c. Results and Discussion 25 %
  d. Conclusions 10 %

Sign-in/Sign-out

For each lab you will be required to sign in and out to receive the 20 percentage points for participation. You will not be allowed to sign out until the lab space is clean and all equipment has been returned to its appropriate place. We will be sharing this lab with another class this semester, so it is important to keep the lab clean.

Things to remember

- After finishing the experiments, clean the instruments and the work area.
- Data sheets should be typed in Excel
- Sample calculations can be typed or written neatly on engineering paper and placed as an appendix of the report. The remainder of the report should be typewritten.
- Use captions for figures and tables! Refer to these figures and tables specifically in the text using the figure/table number!

Tentative Schedule (Subject to change):

Lesson No.	Date	Topic	Lesson Material
		Week 1	
	8/25 & 8/27	**NO LAB**	
1 2	8/25	Material types, properties and standards for testing and design Aggregates	Chapter 1 2.1-2.3.3
2 (cont'd) 3	8/27	Aggregates (cont'd) Sampling and particle size distribution	2.1-2.3.3 (cont'd) 2.3.4
		Week 2	
	9/1 & 9/3	**NO LAB**	
-	**9/1**	**LABOR DAY - No Class**	-
4 5	9/3	Concrete and Cement - Part 1 Concrete and Cement - Cement Behavior and Composition	3.1-3.1.1, 3.3-3.4.2, 3.5 3.4.3-3.4.6
		Week 3	
	9/8 & 9/10	**NO LAB**	
	9/8	**CENSUS DAY**	-
6 7	9/8	Properties of Good Concrete Concrete Properties - Field Testing and Curing	3.5-3.7 3.7-3.7.4
7 (cont'd) 8	9/10	Concrete Properties - Field Testing and Curing (cont'd) Properties of Hardened Concrete	3.7-3.7.4 (cont'd) 3.8-3.8.5
		Week 4	
Lab 1	9/15 & 9/17	**Lab 1:** Aggregate ~ Moisture Content, Unit Weight, Sieve Analysis and Absorption Capacity	AGG-1,AGG-3,AGG-7
9 10	9/15	Concrete Properties, Creep and Shrinkage Concrete Mix Design	3.8.6-3.9.4 3.10
10 (cont'd) 11	9/17	Concrete Mix Design (cont'd) Concrete Types & Ch. 19 IBC	3.10 (cont'd) 3.11-3.13, IBC 19
		Week 5	
Lab 2	9/22 & 9/24	**Lab 2:** Tension Test of Metals	-
12 13	9/22	Introduction to Steel Steel Types and Properties	7-7.2 7.2-7.3
13 (cont'd) 14	9/24	Steel Types and Properties (cont'd) Structural Steel	7.2-7.3 (cont'd) 7.4-7.4.1
		Week 6	
Lab 3	9/29 & 10/01	**Lab 3:** Making Concrete ~ Batching, Mixing, Slump Test and Construct Concrete Cylinders	CON-1,CON-2,CON-3,CON-4
15 16	9/29	Reinforcing Steel Laboratory Strength Test of Steel	7.5-7.7 Cordon Book
16 (cont'd) -	10/1	Laboratory Strength Test of Steel (cont'd) Exam 1 Review	Cordon Book (cont'd)
		Week 7	
Lab 4	10/06 & 10/08	**Lab 4:** 7 Day Concrete Strength Test	-
-	**10/06**	**EXAM 1**	-
17 18	10/8	Introduction to Masonry Properties and Size of Masonry Units	4-4.1.3 4.1.4-4.1.8
		Week 8	
-	10/13 & 10/15	**NO LAB**	CON-3
18 (cont'd) 19	10/13	Properties and Size of Masonry Units (cont'd) Mortar and Grout	4.1.4-4.1.8 (cont'd) 4.2-4.2.3, 4.2.4
20 21	10/15	Masonry Construction Properties of Masonry	4.3.1 4.3.2-4.5

		Week 9	
Lab 5	10/20 & 10/22	**Lab5:** Construct Masonry Prisms	MAS-3,MAS-5
22 23	10/20	Introduction to Timber Defects, Deterioration, and Shrinkage of Wood	5.1-5.3.3 5.3.4-5.5.1
24 25	10/22	Classification of Wood for Construction What Happened? Failure Modes of Wood	5.9-5.9.1 5.6-5.8.2
		Week 10	
Lab 6 **Lab 7**	10/27 & 10/29	**Lab 6:** 7 Day Masonry Prism Crush Test **Lab 7:** 28^{+} Day Compressive Strength of Cylinders	CON-3 / MAS-8
26 27	10/27	Wood Products Wood Construction and Load Path	5.9.2, 5.10-5.10.2 5.10.3-5.12
27 (cont'd) 28	10/29	Wood Construction and Load Path (cont'd) Wood Testing	5.10.3-5.12 (cont'd) Cordon, IBC 23
		Week 11	
	11/03	**LAST DAY TO WITHDRAW FROM CLASSES**	
Lab 8	11/03 & 11/05	**Lab 8:** High Strength Concrete Lab	-
29 30	11/3	IBC Chapters 2 and 3: Occupancy Classification IBC Chapter 6: Construction Types	IBC Chapters 2 and 3 IBC Chapter 6
30 (cont'd) 31	11/5	IBC Chapter 6: Construction Types (cont'd) IBC Chapter 5: General Building Height and Area	IBC Chapter 6 (cont'd) IBC Chapter 5
		Week 12	
Lab 9	11/10 & 11/12	**Lab 9:** Timber Lab ~ WOOD 2, 3, 4	WOOD-2,WOOD-3,WOOD-4
32 33	11/10	ASTM Overview Asphalt Types	PowerPoint 6.2-6.4
34 -	11/12	Properties of Asphalt EXAM 2 - Review	6.4-6.5.3 -
		Week 13	
Lab 10	11/17 & 11/19	**Lab 10:** IBC Chapter 5 and 6 Lab	-
-	**11/17**	**EXAM 2**	**-**
35 36	11/19	HMA and Flexible vs. Rigid Pavements IBC Chapter 10: Means of Egress	6.6-6.7.2 IBC 10 (PowerPoint)
11/24 to 11/28		**Week 14 - Thanksgiving Closure**	**-**
		Week 15	
	12/01	Final Week	-
36 (cont'd) 37	12/1	IBC Chapter 10: Means of Egress (cont'd) Plastics	IBC 10 (PowerPoint) (cont'd) Chapter 8
37 (cont'd) -	12/3	Plastics (cont'd) High Level Exam Review	Chapter 8 (cont'd) -
		Week 16	-
Final Exam	**TBD**	**COMPREHENSIVE FINAL EXAM**	**-**