University of Texas at Tyler - Department of Civil Engineering
CENG 4412 Reinforced Concrete and Steel Design
Course Syllabus; Fall 2023
As of August 21st, 2023

Instructor: *Section 001 (Tyler Campus)*
Dr. Elina Efthymiou
RBS 1036
TBA
eefthymiou@uttyler.edu

Office Hours:
M/W/F: 10:30AM – 12:30PM
or by appointment

Lecture:
Monday/Wednesday/Friday: 9:05 – 10:00 AM, RBN 3039

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

Catalog Description:
Design of reinforced concrete members: beams, one-way slabs, and columns using the ACI 318 design code. Design of steel members: tension members, beams, columns, and connections using the AISC LRFD code.

Learning Objectives:
1. Given a set of functional requirements and an architectural concept, design a low-rise structural steel or concrete building.
2. Describe the characteristics and behavior of structural steel.
3. Describe the advantages and disadvantages of using structural steel as a building material.
4. Describe the advantages and disadvantages of using reinforced concrete as a building material.
5. Explain and apply the stages/phases of the engineering design process model.
6. Perform a load analysis using ASCE 7-05 for dead load, live load, snow load, roof live load, and wind load.
7. Use the LRFD load case combination equations to develop load case combinations for structural analysis.
8. Apply the LRFD methodology: $\phi R_n \geq \Sigma \gamma_i Q_i$
9. Model braced and rigid frames as lateral load-resisting systems.
10. Reduce a real-world 3 dimensional frame to a 2 dimensional model, accounting for the applied loads, connected members, and out of plane behavior.
11. Analyze and design a structural steel tension member assembly (tension member and connecting element).
12. Analyze and design a structural steel compression member.
13. Analyze and design a structural steel beam and girder.
14. Analyze and design a structural steel beam-column.
15. Analyze and design a reinforced concrete beam.
16. Analyze and design a reinforced concrete column.
17. Analyze and design a reinforced concrete beam column.
18. Analyze and design a reinforced concrete slab
19. Use modern engineering software to solve problems.

20. Function effectively as a member of a design team.

Course Description and Philosophy
In this course you will learn to perform structural design as it is performed in engineering practice and you will be exposed to the engineering design process. In particular we will be focusing our efforts on using the American Institute of Steel Construction Manual of Steel Construction and the American Concrete Institute Building Code Requirements for Structural Concrete. You will be applying principles from previous math, physics, and mechanics courses throughout this course and we will work to maximize the use of your computer in support of our work. This course has 15 specific objectives (see Encl 3). They can be generally organized into two groups: (1) learning to internalize the engineering thought process by developing the ability to solve ill-defined, real world problems in a rational, systematic, and creative manner and presenting your solution in a clear and concise way; and (2) developing a working knowledge of structural concrete and steel design and incorporating the Load and Resistance Factor Design (LRFD) philosophy to examine problems with realistic constraints.

Prerequisites:
CENG 3325: Structural Analysis

Co-requisite:
CENG 3434: Civil Engineering Materials, Codes and Specifications

Required Texts:
AISC Manual of Steel Construction (15th Edition)
ACI 318-19 Building Code Requirements for Structural Concrete

Class Attendance
Class attendance is mandatory. It is important to take the necessary precautions to ensure a healthy and successful year. UT Tyler continues to urge you to protect yourselves against the flu, COVID and any new threats that may be developing. Be diligent about preventive measures such as washing hands, covering sneezes/coughs, social distancing, and vaccinations, which have proven to be successful in slowing the spread of viruses. Encourage those who don't feel well to stay home, and if they show symptoms, ask them to get tested for the flu or COVID. Self-isolation is important to reduce exposure (CDC quarantine/isolation guidelines). Please work with your instructor ASAP to maintain coursework.

Note About the Syllabus
This syllabus is a statement of intent about how the course will be taught this semester. It outlines what we will cover, what you will need to do in the course, and it explains what and when you must do it to successfully complete the course and get a great final grade. This syllabus is intended to protect you from arbitrary or untimely changes in course requirements and due dates. But I reserve the right to make changes as necessary to the syllabus with announcement of changes. As we learned during 2020, there are many circumstances outside of our direct course control that may require changes to this syllabus in content and schedule. These will always be announced in advance and the syllabus will be updated on Canvas so all can be aware of the required changes.

Course Schedule (Subject to Change):

CENG 4412 Reinforced Concrete and Steel Design Course Schedule; Fall 2023							
Lsn. #	**Date**		**C/S/B**	**Block**	**Topic**	**Assign (TBA)**	**Submit (TBA)**
1	8/21/23	Mon	B	SS1	Course intro & overview		
2	8/23/23	Wed	B	SS2	Structural Steel Fundamentals; Mechanical Behavior of Structural and Reinforcing Steel		
3	8/25/23	Fri	B	SS3	Loads Review Load Cases		
4	8/28/23	Mon	B	SS4	Structural Systems Simplified Probabalistic Model LRFD Philosophy		
5	8/30/23	Wed	S	TM1	Tension Member Overview Tension Member Analysis		
6	9/1/23	Fri	S	TM2	Tension Member Block Shear Bolt Stagger **Census Date**		
	9/4/23	Mon			**Labor Day holiday**		
7	9/6/23	Wed	S	TM3	TM Design		
8	9/8/23	Fri			**No Class** Work on EDP; Study for Exam		
9	**9/11/23**	**Mon**		**EX**	**Exam 1** Structural Steel Fundamentals & TM Block		
10	9/13/23	Wed	C	CB1	Concrete Beam Behavior and Whitney Stress Block		
11	9/15/23	Fri		EDP	**EDP #1 Presentation**		EDP 1
12	9/18/23	Mon	S	CN1	Bolts - Intro and Strength Constructability and Examples		
13	9/20/23	Wed	C	CB2	Concrete Beam Nominal and Design Capacity		
14	9/22/23	Fri	C	CB3	Concrete Beam Shear		
15	9/25/23	Mon	S	SB1	Steel Beam Intro - Flexural Response of Steel Beams		
16	9/27/23	Wed	B	SS5	Structural Drawings		
17	9/29/23	Fri	S	SB2	Design Strength of Steel Beams		
18	10/2/23	Mon	S	SB3	Local Bucking in Steel Beams		
19	10/4/23	Wed	S	SB4	Effects of Moment Gradient on Strength of Steel Beams		
20	10/6/23	Fri	S	SB5	Use of Steel Design Aids Shear in Steel Beams		
21	10/9/23	Mon	S	SB6	Other Steel Beam Limit States Serviceability		
22	10/11/23	Wed	C	CB4	Concrete Beams Development Length		
23	10/13/23	Fri	S	SB7	Steel Beam Design		
24	10/16/23	Mon	C	CB5	Doubly Reinforced Concrete BeamsConcrete Beam Serviceability		
25	10/18/23	Wed		EDP	**EDP #2 Presentation**		EDP2
26	10/20/23	Fri	S	SC1	Intro to Steel Column Response		
27	10/23/23	Mon	S	SC2	Global Buckling & Residual Stresses in Steel Columns		
28	10/25/23	Wed	C	CB6	Concrete Beam Long Term Deflections		
29	10/27/23	Fri	S	SC3	Local Buckling in Steel Columns		
30	10/30/23	Mon	S	SC4	Torsional & Flexural Torsional Buckling Built-up Member Behavior **Last Day to Withdraw from One or More Courses**		
31	11/1/23	Wed	C	CC1	Concrete Columns I		
32	11/3/23	Fri		EDP	**EDP #3 Presentation**		EDP3
33	**11/6/23**	**Mon**		**EX**	**Exam #2** **Concrete Beams and Steel Beams**		
34	11/8/23	Wed	S	SC5	Steel Column Design		
35	11/10/23	Fri	C	CC2	Concrete Columns 2		
36	11/13/23	Mon	C	CC3	Concrete Long Columns		
37	11/15/23	Wed			**No Class** Work on EDP; Study for Exam		
38	**11/17/23**	**Fri**	**EX3**		**Exam #3** **Steel Columns and Concrete Columns**		
	11/20/23	Mon			**Thanksgiving Holidays**		
	11/22/23	Wed					
	11/24/23	Fri					
39	11/27/23	Mon	C	CS1	Concrete One Way Slabs 1		
40	11/29/23	Wed	C	CS2	Concrete One Way Slabs 2		
41	12/1/23	Fri	B	RVW	Wrap Up and Review EDP Submission		EDP
*Subject to revision by the instructor							

Exams:
There will be 3 midterm examinations and one final examination.

Exams and the Final are closed notes. The ONLY references for these exams are your own personal copies of the AISC Manual for Steel Construction, and ACI Building Code Requirements, and a calculator. You may not use another individual's AISC or ACI 318 manual. You may, however, make notes in your own manual (in fact, this is encouraged), and you may (and must) tab your manual to aid in navigating this large document. You may NOT attach additional sheets to the manual, and your notes within must be written in your own hand. You can use a TI-30 calculator (or FE equivalent). *Solutions to exams will NOT be posted on Canvas*. No make-up exams will be given except for medical or other similar hardships where advanced arrangements are made with the instructor; or in case of non-selective medical emergencies with appropriate physician's note or documentation. Other than circumstances described above, failure to take the exam at the scheduled time will constitute a grade of zero in the exam. **EXAMS 1, 2 and 3 WILL BE HELD IN PERSON AT NIGHT FROM 5-7 PM. THERE ARE NO EXCEPTIONS, SO YOU WILL NEED TO PLAN ON SHOWING UP TO CLASS DURING THOSE DATES.**

Homework:
Homework will be assigned on a regular basis (see schedule). Homework is due on the date outlined in the schedule. **You will need to upload your homework as a single pdf file to canvas no later than 11:59pm on the date it is due.**

Homework Submission Guidelines (Professionalism Requirements):
1. Homework should be submitted on-line only and will not be accepted on paper.
2. The header of the first page should include the following:
    a. Name of Student
    b. Student Number
    c. Course Number and Name
    d. Homework Number
3. Start each problem on a new page. This is to ensure that there is enough space on the paper for the grader to add comments.
4. All problems should include:
    a. Problem Number
    b. A diagram of the problem (draw all free body diagrams when necessary)
    c. A set of given quantities
    d. A set of unknown quantities
    e. A set of assumptions
5. All numbers and writing should be clear and readable.
6. 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!
7. The **final answer should be boxed** and at the end of the solution.
8. Before you upload your file to canvas, make sure the scanned document is clear and can be easily read!

Grades:

Homework/Quizzes =	500 pts	20%
Professional Practice =	200 pts	8%
Midterm Exams (4) =	600 pts	24%
Engineering Design Problem	500 pts	20%
Writing Assignment	100 pts	4%
Final Exam	600 pts	24%

Grade Scale:

A:	90-100
B:	80-89
C:	70-79
D:	60-69
F:	<60

If necessary, I reserve the right to adjust the grade scale at the end of the semester to your benefit. If you earn less than 65% on all Exams or if you fail to earn at least 50% on the Final you may fail the course, **regardless of your course grade**.

****NOTE:** There will be no makeup work or extra credit allowed/granted at the end of or during the semester unless allowed/granted to everyone by the instructor. All assignments must be turned in at the appropriate time to receive credit.

Quizzes:
The instructor will give unannounced in-class quizzes throughout the semester. The format of the problems will be similar to the FE exam.

Professional Practice:
Your professional practice grade will be broken down into two components. (1) 5% of the 10% percentage points will be based on your attendance at **3 ASCE student technical meetings** (cookout and game night events do not count) throughout the fall semester. Example of valid meetings include guest speakers, field trips, or any other technical meeting from either organization within the college of engineering. (2) the remaining 5 percentage points is based on the professionalism in which you carry yourself in the class.

Laptops/PDAs/MP3 players/Cell Phones or other electronic devices:

- The use of any electronic device, except an approved calculator, is not permitted during exams. Your exam will be collected and your grade will be a zero if you are caught using a non-approved electronic device/calculators. Any instances of a calculator inappropriately used during an exam will be the basis of alleging Academic Misconduct and may result in Failing (F) of the course at the determination of the course's instructor or the basis for a recommendation for expulsion from the University. Any Calculator used during an exam in this course must meet the requirements stated within the policy below.

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 include the following: (Please check the NCEES website for a complete listing, www.ncees.org/exams/calculator-policy/. Examples include but are not limited to:

- Hewlett Packard – HP 33s, HP 35s, and no others
- Casio – All FX 115 models
- Texas Instruments – All TI 30X or TI-36X models.

- If you are unsure about your calculator, it is your responsibility to check with the instructor for approval.

At the discretion of the course instructor, any calculator not meeting the requirements stated (especially in the case of a graphing calculator) may be used but only after an inspection of the device and a clearing of all the memory within the device, performed for the instructor at a time immediately prior to the exam. At any time during the exam your calculator is subject to a random search by the instructor. Failure or refusal to clear all memory or to surrender your calculator to search will disqualify you from the exam immediately, unless you can produce a calculator meeting the requirements as stated above.

Final day to withdraw:
The final day to withdraw from the course without penalty is **October 31st**

Census dates:
The university requires that instructors report the attendance to the register at various points in the semester. Therefore, on **September 1st** I will report the attendance for the class.

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.

Other Important Information for Students:

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/rightsresponsibilities.php
Campus Carry	We respect the right and privacy of students 21 and over who are duly licensed to carry concealed weapons in this class. License holders are expected to behave responsibly and keep a handgun secure and concealed. More information is available at http://www.uttyler.edu/about/campus-carry/index.php
UT Tyler: A Tobacco-Free University	All forms of tobacco will not be permitted on the UT Tyler main campus, branch campuses, and any property owned by UT Tyler. This applies to all members of the University community, including students, faculty, staff, University affiliates, contractors, and visitors. Forms of tobacco not permitted include cigarettes, cigars, pipes, water pipes (hookah), bidis, kreteks, electronic cigarettes, smokeless tobacco, snuff, chewing tobacco, and all other tobacco products. There are several cessation programs available to students looking to quit smoking, including counseling, quitlines, and group support. For more information on cessation programs please visit www.uttyler.edu/tobacco-free.

Grade Replacement / Forgiveness and Census Date Policies	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 of which students need to be aware. 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
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 Texas at Tyler offers accommodations to students with learning, physical and/or psychological disabilities. If you have a disability, including a non-visible 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 Cynthia Lowery, Assistant Director of Student Services/ADA Coordinator. 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.
Emergency Exits and Evacuation	Everyone is required to exit the building when a fire alarm goes off. Follow your instructor's directions regarding the appropriate exit. If you require assistance during an evacuation, inform your instructor in the first week of class. Do not re-enter the building unless given permission by University Police, Fire department, or Fire Prevention Services.
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. **<u>"Cheating"</u>** includes, but is not limited to: • copying from another student's test paper; • using, during a test, materials not authorized by the person giving the test; • failure to comply with instructions given by the person administering the test; • 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; • using, buying, stealing, transporting, or soliciting in whole or part the contents of a non-administered test, test key, homework solution, or computer program; • collaborating with or seeking aid from another student during a test or other assignment without authority; • discussing the contents of an examination with another student who will take the examination; • 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; • substituting for another person, or permitting another person to substitute for oneself to take a course, a test, or any course-related assignment; • paying or offering money or other valuable thing to, or coercing another person to obtain an unadministered test, test key, homework solution, or computer program or information about an unadministered test, test key, home solution or computer program; • falsifying research data, laboratory reports, and/or other academic work offered for credit; • 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 • 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)

Recording of Class Sessions: Class sessions may be recorded by the instructor for use by students enrolled in this course. Recordings that contain personally identifiable information or other information subject to FERPA shall not be shared with individuals not enrolled in this course unless appropriate consent is obtained from all relevant students. Class recordings are reserved only for the use of students enrolled in the course and only for educational purposes. Course recordings should not be shared outside of the course in any form without express permission.

Academic Misconduct: Plagiarism of homework and cheating on examinations will be interpreted as academic misconduct and will not be tolerated. Please refer to the University of Texas at Tyler current Undergraduate Catalog for academic policies and Manual of Policies and Procedures for Student Affairs (MOPPS, Chapter 8) regarding academic integrity, cheating and plagiarism. Academic dishonesty will not be tolerated. Ignorance of the rules and policies provides no protection from the consequences.

Collection of Student Work:
Throughout the semester I will collect student work (best, average, and worst) for the ABET 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.

Prepared by: Elina Efthymiou, Ph.D.
Assistant Professor of Civil Engineering
Department of Civil Engineering