CE 1301 – Civil Engineering Fundamentals – Spring 2017

The University of Texas at El Paso
Department of Civil Engineering
Class: Tues/Thurs 8:00-8:50am, UGLC 346
Lab: MTWR 9:00-11:50am, ENGR E-213
CRN: 17365
Corequisite: MATH 1411 Calculus

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Philosophy

I believe that *teaching* and *learning* are interdependent; you cannot have one without the other. You and I are partners and colleagues, working together to help you become a knowledgeable, curious, intrinsically motivated, and confident engineer. I want to help you become a critical thinker with sharpened skills of analysis, evaluation, and synthesis. I incorporate team-based, hands-on projects in all of my courses to help prepare you for professional practice and to help you become a more robust and intrinsically-motivated engineer. I have also realized that it is important to provide frequent homework assignments and quizzes, which help students keep up with understanding and applying concepts. Thus, I have implemented a combination of homework assignments, quizzes, exams, and team projects in all of my courses, with strategic emphasis for the particular course.

For many of you enrolled in this course, this may be your first semester in college. And for many people, college is a rite of passage to adulthood. I will operate with the expectation that you are adults. Also, some engineers and educators take the perspective that you are not an engineer until you graduate or receive your license, but I will operate with the expectation that you are already engineers (see code of ethics below).

Required Course Materials:

- MasteringEngineering **(provided through UTEP Blackboard)** ***AND***
- **Engineering Mechanics: Statics & Dynamics, 14th Edition, R.C. Hibbeler, 2015, Pearson**
  You can either purchase a hardcopy textbook, or you can purchase access to an electronic copy on the web through MasteringEngineering (see Homework section below). (Alternatively, you may purchase the 14th Ed. Statics and 14th Ed. Dynamics textbooks separately.)

Supplemental Materials:

- Engineering Statics by Carnegie Mellon (https://oli.cmu.edu/jcourse/webui/guest/join.do?section=statics)
- Khan Academy: forces and torque (moments)
  - https://www.khanacademy.org/math/trigonometry
  - https://www.khanacademy.org/science/physics/forces-newtons-laws
  - https://www.khanacademy.org/science/physics/torque-angular-momentum/torque-tutorial/v/introduction-to-torque

Description and Objectives

This course involves a hands-on survey of the five disciplines of civil engineering (geotechnical, structural, transportation, environmental, and construction) and an introduction to engineering mechanics with a focus on the fundamentals of statics. The objectives of this course are to develop:

- an understanding of the breadth of the civil engineering profession and the significant role that civil engineers provide in civilization
- an understanding of several typical career pathways for civil engineers, especially including professional engineering licensure
- an intuitive understanding of loads and moments
- a mathematical vector analysis of forces and moments in static structures
- fundamental analysis of reaction forces and moments on static rigid bodies
- introduction to dynamics with conservation of energy, momentum, and angular momentum

Expectations

Participation: More than simply attending class, you are invited to *think,* and *participate* in the lectures and discussions. I encourage you to be curious and inquisitive during lectures and discussions.
Preparedness: I recommend that you bring the textbook, a personal course notebook, a pen or pencil, a calculator, completed homework assignments, and questions from the homework and assigned reading.
Punctuality: You are expected to be on time to class, laboratory exercises, and tours. Assignments submitted late will not be graded and will receive no credit.
Ethics: In engineering, personal integrity is of utmost importance, especially in the design of civil infrastructure. Also, in most cases, it is necessary to work in teams to develop and design optimal solutions to problems and challenges, and it is essential that each team member contribute to the productivity of the team. In this course, I strongly recommend that you complete homework assignments in teams; in many cases, you will help each other through the solution of difficult problems. My goal for the homework is for you to develop proficiency in the basic application and calculations in design. Thus, every student is accountable for *understanding* the concepts, analysis, and solution. My goal for team projects is for you to have opportunity to apply this theory in a deeper and more meaningful way than homework. Each student is accountable for understanding and *contributing* (equitably) to the team projects. Any student committing plagiarism (*e.g.*, copying another's work) or any other form of academic dishonesty will be reported to the Office of Student Conduct and Conflict Resolution (OSCCR) for disciplinary action (which may include expulsion from the University). For a concise summary of engineering ethics, I have provided here the Fundamental Canons within the Code of Ethics of the American Society of Civil Engineers (ASCE):

1. *Engineers shall hold paramount the safety, health and welfare of the public and shall strive to comply with the principles of sustainable development in the performance of their professional duties.*
2. *Engineers shall perform services only in areas of their competence.*
3. *Engineers shall issue public statements only in an objective and truthful manner.*
4. *Engineers shall act in professional matters for each employer or client as faithful agents or trustees, and shall avoid conflicts of interest.*
5. *Engineers shall build their professional reputation on the merit of their services and shall not compete unfairly with others.*
6. *Engineers shall act in such a manner as to uphold and enhance the honor, integrity, and dignity of the engineering profession and shall act with zero-tolerance for bribery, fraud, and corruption.*
7. *Engineers shall continue their professional development throughout their careers, and shall provide opportunities for the professional development of those engineers under their supervision.*
8. *Engineers shall, in all matters related to their profession, treat all persons fairly and encourage equitable participation without regard to gender or gender identity, race, national origin, ethnicity, religion, age, sexual orientation, disability, political affiliation, or family, marital, or economic status.*

Homework

Homework assignments will be completed through MasteringEngineering, which is provided to you through UTEP Blackboard (available from https://my.utep.edu/). Registration instructions are posted on the Blackboard homepage for this course. You will need to purchase access before the 14-day trial expires, and. Homework assigned will be due the following class day (*i.e.*, homework assigned on Tuesday will be due Thursday, and homework assigned on Thursday will be due Tuesday).

Your average homework grade constitutes a significant fraction of your overall course grade, so I strongly urge you to give your full devotion to understanding and mastering the concepts in the homework assignments. Moreover, the exams are based on the concepts in the homework, so as you diligently study to understand the concepts in the homework assignment, you are implicitly studying for the exams. In this information age with Google search at our fingertips, it might be tempting to search the internet for solution steps to the homework problems, but BEWARE: USING POSTED SOLUTIONS IS A CANCER FOR YOUR INTELLIGENCE. The main points of engineering education are to learn fundamental principles and to train yourself how to innovate and solve complex problems. If you rely on examples and posted solutions, you rob yourself of the hard work that is required to force your brain to figure out how to

FIGURE OUT STUFF ON YOUR OWN. I liken engineering education to wilderness survival training. Of course, you need someone to prepare you with some basic principles and skills of how to search for water, food, and basic shelter, but at some point, you have to be dropped out in the middle of the wilderness to learn how to survive. So, DO YOUR HOMEWORK!

Quizzes

I will be using a cloud-based student response software by iClicker in class this semester for quizzing and polling. You will need to create an iClicker Reef Student account to participate in class using your laptop, smart phone, or tablet connected to the university's Wi-Fi (UTEPSecure) or to your mobile data plan. Sign in to Blackboard (available from https://my.utep.edu/) and click the link for this course. Search for the iClicker REEF icon on the Home Page. Click this link to launch a special instance of REEF, then log in, or create a new REEF account if you don't already have one. **When creating your account, use your university email address** (username@miners.utep.edu). You will not need to purchase a subscription to use iClicker REEF this semester because it is provided to you for free. Signing into REEF through the link in Blackboard will automatically add you to my course. When asked to register a remote device, choose "not at this time". Note: submitting votes for a fellow student is considered cheating and a violation of the University Honor Code and the Civil Engineering Honor Code. If you are caught voting for another student or have votes in a class that you did not attend, you will be referred to OSCCR for disciplinary action.

Exams

All exams are closed-book and closed-notes; that is, you are not allowed to use your textbook or any other references (printed, hand-written, electronic, digital, audio, video, etc.) other than those provided to you by the professor in or with the exam. Following NCEES policy (http://ncees.org/exams/calculator/), the only calculator models acceptable for use during exams are as follows:

- Casio: All fx-115 and fx-991 models (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 (must have "TI-30X" or "TI-36X" in its name)

At the end of the exam, you will be asked to sign two ethical statements:

- *I have maintained ethical integrity and have not committed any form of academic dishonesty in accordance with the UTEP Handbook of Operating Procedures, the UTEP Civil Engineering Honor Code, and the ASCE Code of Ethics.*
- *I have not witnessed any other student commit any form of academic dishonesty with regard to this exam.*

These two statements, respectively, are analogous to your engineering ethical obligations to (1) certify your own work with your engineer's seal and (2) report unethical behavior performed by other engineers. If you do not sign agreement to one or both of the ethics statements, then I will email you to schedule a private discussion in my office. If you reveal unethical behavior (such as academic dishonesty) performed by another individual, then I will submit a report to the Office of Student Conflict and Conflict Resolution (OSCCR) for their investigation.

Laboratory

The laboratory activities will follow the schedule listed below. Laboratory assignments will be posted on Blackboard (available through https://my.utep.edu/), and team lab reports will be submitted electronically on Blackboard. Tours will be graded based on attendance and punctuality.

Peer Evaluation

Peer evaluations of team members will be facilitated with the laboratory exercises. Your peers will evaluate you based on five dimensions of team-member contributions (Contributing to Work; Interacting with Teammates; Keeping Team on Track; Expecting Quality; and Having Knowledge/Skills).

Evaluation

Assessment of your performance in this course will be determined by class attendance and participation, homeworks, quizzes, and exams. (No makeup exams will be offered.) Handwritten homework calculations must be submitted on engineering paper. The total course average will be computed by the following:

Evaluation	Contribution (%)
Homeworks (25 + follow-ups)	25
Quizzes	10
Midterm Exams (4)	30
Final Exam (comprehensive)	20
Lab reports and participation	10
Lab peer evaluation	5
Total	*100*

A bonus of 5 points will be awarded to active members of the UTEP ASCE student chapter at the end of the semester:

Final Grade

A final exam score of at least 50% is required to pass the course. Furthermore, the final course grade will be determined according to the following:

Average (%)	Grade
≥ 90	A
80-89	B
70-79	C
60-69	D
< 60	F

I reserve the right to modify or augment this syllabus for the sake of improving the educational effectiveness of this course. Notice will be provided in class and by email, and the current version of the syllabus will be posted on Blackboard.

Special Accommodations

The University of Texas at El Paso provides, upon request, appropriate academic accommodation for students with disabilities. For more information, contact the Center for Accommodations and Support Services (http://sa.utep.edu/cass/).

Course Schedule

Class	Day	Date	Topics	Reading	Assignment
1	T	AUG 29	Introduction to Civil Engineering & Honor Code	-	HW 1
2	R	31	General Principles and Trigonometry review	Ch. 1.1-6	HW 2
3	T	SEP 5	Force vectors: resolving into components	Ch. 2.1-3	HW 3
4	R	7	Addition of force vectors	Ch. 2.1-3	HW 4
5	T	12	Solving for an angle to balance forces	Ch. 2.1-3	HW 5
6	R	14	Addition of a system of coplanar forces	Ch. 2.4	HW 6
7	T	19	Cartesian (3D) vectors: single force comps. & angles	Ch. 2.5	HW 7
8	R	21	Cartesian vectors: resultant force	Ch. 2.6	HW 8
9	T	26	Position vectors and force vector along a line	Ch. 2.7-2.8	HW 9
10	R	28	**EXAM 1 – Statics Ch. 1-2.4**	**-**	**HW 1-6**
11	T	OCT 3	Dot product	Ch. 2.9	HW 10
12	R	5	Particle Equilibrium and Free-Body Diagrams	Ch. 3.1-3	HW 11
13	T	10	Coplanar Force Systems with springs	Ch. 3.1-3	HW 12
14	R		Three-dimensional force systems	Ch. 3.4	HW 13
15	T	17	Dry friction	Ch. 8.1-2	HW 14
16	R		**EXAM 2 – Statics Ch. 2.5-9, 3.1-4**	-	**HW 7-13**
17	T	24	Moment of a force: scalar formulation	Ch. 4.1	HW 15
18	R		Moment of a force: vector formulation	Ch. 4.2-3	HW 16
19	T	31	Moments: three-dimensional	Ch. 4.4	HW 17
20	R	NOV 2	Reduction of a simple distributed loading	Ch. 4.9	HW 18
21	T	7	Equilibrium of a rigid body	Ch. 5.1-3	HW 19
22	R	9	Rectilinear Kinematics	Ch. 12.1-2	HW 20
23	T	14	Projectile Motion	Ch. 12.4-6	HW 21
24	R	16	**EXAM 3 – Statics Ch. 8.1-2; 4.1-4,9; 5.1-3**	-	**HW 14-19**
25	T	21	Circular motion: normal and tangential	Ch. 12.7	HW 22
-	R	23	*Thanksgiving Holiday*	-	-
26	T	28	Equations of motion	Ch. 13.1-4	HW 23
27	R	30	Conservation of Energy (potential & kinetic)	Ch. 14.1-3, 6-7	HW 24
28	T	DEC 5	Conservation of Momentum	Ch. 15.1-3	HW 25
29	R	7	**EXAM 4 – Dynamics Ch. 12-15**	**-**	**HW 17-25**
30	R	14	*FINAL EXAM - 7:00-9:45AM*	*(comprehensive)*	*HW 1-25*

Tentative Laboratory Schedule (MTWR) – *subject to change*

Week	Starting		Activities
-	AUG	28	*First week of class (no labs)*
-	SEP	4	*Labor Day week (no labs)*
1		11	Soil bearing strength
2		18	Concrete mix and cylinders
3		25	Water resources and treatment
4	OCT	2	Construction drawing scavenger hunt
5		9	City Engineering Office Tour
6		16	Compression test concrete cylinders
7		23	Tire-pavement friction
8		30	Weld steel straps
9	NOV	6	Tensile test welded steel bars
10		13	Fred Hervey Reuse Plant Tour
-		20	*Thanksgiving week (no labs)*
11		27	Tower strength testing
12	DEC	4	Parkhill, Smith & Cooper Tour