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: 28206
Corequisite: MATH 1411 Calculus

Instructor: W. Shane Walker, Ph.D., P.E.
Email: wswalker2@utep.edu
Office: Engineering A-215
Phone: (915) 747-8729
Office hours: Tues/Thurs, 1:30-2:30pm

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.

Required Course Materials:

- MasteringEngineering **for** "CE1301SPR17WALKER"
  AND
- **Engineering Mechanics: Statics & Dynamics, 14th Edition, R.C. Hibbeler, 2015, Pearson**
  (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/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 assessment and reporting of environmental conditions. 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 the 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 without understanding) or any other form of academic dishonesty will be reported to the Dean of Students 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 development3 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.*

Homework

Homework assignments will be completed through Mastering Engineering (www.masteringengineering.com). You will need to purchase access ($80 for homework only or $140 for homework with eText access) and register for course "CE1301SPR17WALKER". (If you are not registered for the Mastering Engineering homework by the end of the first week of classes, you will be dropped from the course.) 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).

Exams

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

Laboratory

The laboratory activities will begin the second week of class. 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 through the Comprehensive Assessment of Team Member Effectiveness (CATME) system. Students will receive an email invitation to log-in online to rate themselves and their teammates using a secure, web-based interface to evaluate based on five dimensions of team-member contributions (Contributing to Work; Interacting with Teammates; Keeping Team on Track; Expecting Quality; and Having Knowledge/Skills). The system allows instructors to view each student's ratings of every team member, which increases students' accountability for their ratings. Students can also make confidential comments in the system, which go only to their instructor. The system also allows instructors to release feedback to their students. The feedback shows students their self-rating, the average rating that teammates gave the student, and the team-average rating for each of the five dimensions of the CATME Peer Evaluation scale. In addition, the feedback suggests behaviors that could improve students' ratings in each of the five dimensions. For more information, please visit http://info.catme.org/.

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)	30
Midterm Exams (4)	30
Final Exam (comprehensive)	25
Lab reports and participation	10
Lab Peer Eval. (CATME)	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 grading scheme for the sake of improving the educational effectiveness of this course.

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	JAN	17	Introduction to Civil Engineering & Honor Code	-	HW 1
2	R		19	General Principles and Trigonometry review	Ch. 1.1-6	HW 2
3	T		24	Force vectors: resolving into components	Ch. 2.1-3	HW 3
4	R		26	Addition of force vectors	Ch. 2.1-3	HW 4
5	T		31	Solving for an angle to balance forces	Ch. 2.1-3	HW 5
6	R	FEB	2	Addition of a system of coplanar forces	Ch. 2.4	HW 6
7	T		7	Cartesian (3D) vectors: single force comps. & angles	Ch. 2.5	HW 7
8	R		9	Cartesian vectors: resultant force	Ch. 2.6	HW 8
9	T		14	Position vectors and force vector along a line	Ch. 2.7-2.8	HW 9
10	R		16	**EXAM 1 – Statics Ch. 1-2.4**	**-**	**HW 1-7**
11	T		21	Dot product	Ch. 2.9	HW 10
12	R		23	Particle Equilibrium and Free-Body Diagrams	Ch. 3.1-3	HW 11
13	T		28	Coplanar Force Systems with springs	Ch. 3.1-3	HW 12
14	R	MAR	2	Three-dimensional force systems	Ch. 3.4	HW 13
15	T		7	Dry friction	Ch. 8.1-2	HW 14
16	R		9	**EXAM 2 – Statics Ch. 2.5-9, 3.1-4**	-	**HW 8-13**
-	T		14	*Spring Break*	-	-
-	R		16	*Spring Break*	-	-
17	T		21	Moment of a force: scalar formulation	Ch. 4.1	HW 15
18	R		23	Moment of a force: vector formulation	Ch. 4.2-3	HW 16
19	T		28	Moments: three-dimensional	Ch. 4.4	HW 17
20	R		30	Reduction of a simple distributed loading	Ch. 4.9	HW 18
21	T	APR	4	Equilibrium of a rigid body	Ch. 5.1-3	HW 19
22	R		6	Introduction to Dynamics	TBD	HW 20
23	T		11	Falling bodies	TBD	HW 21
24	R		13	**EXAM 3 – Statics Ch. 8.1-2, 4.1-4, 5.1-3**	-	**HW 14-19**
25	T		18	Projectile Motion	TBD	HW 22
26	R		20	Conservation of Energy (potential & kinetic)	TBD	HW 23
28	T		25	Elastic collisions and Conservation of Momentum	TBD	HW 24
29	R		27	Rotation and Conservation of Angular Momentum	TBD	HW 25
30	T	MAY	2	Course Review		-
31	R		4	**EXAM 4 – Dynamics**	**-**	**HW 17-25**
32	R		11	*FINAL EXAM - 7:00-9:45AM*	*(comprehensive)*	*HW 1-25*

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

Week	Dates		Activities
-	JAN	16	*MLK Jr. Holiday (no labs)*
1		24	Soil bearing strength
2		31	Water resources and treatment
3	FEB	7	Parkhill, Smith & Cooper Tour
4		14	TxDOT Office Tour
5		21	City Engineering Office Tour
6		28	Weld steel straps
7	MAR	7	Concrete mix and cylinders
-		14	*Spring Break*
8		21	Tire-pavement friction
9		28	Tensile test welded steel bars
10	APR	4	Compression test concrete cylinders
11		11	Fred Hervey Reuse Plant Tour
12		18	Bridge testing
13		25	Construction drawing analysis
14	MAY	2	Marble roller coaster launcher