CIVE 260 STATICS SYLLABUS

COURSE DESCRIPTION

Course Title: CIVE 260 Engineering Mechanics: Statics

Credits: 3 (40 hours of instruction)

Section 001: MWF 10-10:50am in Clark A104

Hello and welcome to Statics! Statics is the branch of engineering mechanics that is concerned with the analysis of forces on physical systems in static equilibrium. Statics will also help you interpret the forces supporting objects we encounter in our daily lives. Besides pure Statics, we will also cover topics to lay the foundation for Dynamics and Solids. The expected workload outside of class is expected to be 3 hours for every credit hour, thus the weekly workload is 3 + 9 = 12 hours.

Dr. Baker's team will be expected to:

- Deliver engaging lectures which introduce, clarify, and integrate course materials
- Provide a wide-array of quality learning opportunities and materials
- Assign well-sculpted assignments and exams materials to enable you and I to know how well you are understanding course material

You will be expected to:

- Learn the material presented in this course
- Tap into your existing intuition, strengths, and passion
- Become an active participant in your Statics education, taking full advantage of lectures, texts, homework, office hours, your fellow students and everyday life!

COURSE OBJECTIVES

By the end of this course, you will be able to:

1. Determine the components of 2D/3D forces and moments in rectangular coordinate systems.
2. Manipulate vector and geometric vectors to compute dot products, moments, and resultants as they relate to engineering problems.
3. Draw complete and correct free-body diagram(s) (including support reactions), then write and solve the appropriate equilibrium equations from the free-body diagram(s).
4. Determine the member forces in within trusses and joint reactions in frames and machines.
5. Compute and draw the shear-force and bending moment diagram for transverse loading on a beam.

6. Analyze equilibrium systems that include frictional forces.
7. Locate the centroid of composite bodies.
8. Calculate the moment of inertia for a given body and axes.
9. Apply virtual work to solve equilibrium problems.

As a participant in this course, I ask you for your attention, hard work, and most of all respect. In return, I will work hard to meet your academic needs, create an atmosphere of learning, and respect and appreciate you as individuals.

INSTRUCTOR INFORMATION

Dr. Dan Baker, PhD PE
Dan.Baker@colostate.edu
Office Hours
Tu Noon-1:30pm in ENGR B206
Th 3-4:30pm in ENGR B206

INSTRUCTIONAL ASSISTANTS

Mohammad Reza, Teaching Assistant, mrhg@rams.colostate.edu

Janelle Stone, Grader and Office Hour Host, janelle.stone@rams.colostate.edu

Nick Weaver, Office Hour Host & TILT Study Group Leader, nickweav@rams.colostate.edu

COURSE MATERIALS

WEBSITE

https://colostate.instructure.com

All course materials presented in class will also be posted on our Canvas website. The majority of the material will be organized by topic in the Modules and the links to lectures from a previous semester and the current semester (if available) are available on the Home page. Here's some useful Canvas guides:

- What do icons and markings on the Grades Page represent?
- How do I view feedback from graded assignments?
- How do I view assignments posted as Quizzes?

If you need technical assistance with the Canvas either (1) visit the Canvas Student Guide page to troubleshoot common issues, (2) email help@colostate.edu or (3) call 970-491-7276.

LECTURES

Lectures will be delivered Monday, Wednesday, and Friday in our assigned classroom. For on-campus students attending and being an active learner during lectures is likely the top way you can succeed in this course.

During the Fall semester there is also an online section of this course, thus lectures are also recorded and posted to the Echo360 tool in the left menu bar. In the spring semester course I will re-post the Fall lecture recordings. I encourage on-campus students to use the recorded lectures should you need to miss class or want to review a section of lecture.

TEXTBOOK

The official textbook for this course is: *Engineering Mechanics: Statics (13th Edition) by R.C. Hibbeler*. Reading assignments will complement material presented in lectures. You need a Statics textbook for the course, but you are also welcome to use the 10th, 11th, 12th, or 14th editions of the Hibbeler Statics text. I'll post PDF's of each HW assignment.

CALCULATORS

Calculators are a vital tool for engineers. As such, we allow you to use your calculator to the fullest of its ability. Additionally, cell phones, computational websites, and computational software may be used on course assignments, however these additional tools cannot be used on exams. Only non-graphing scientific calculators will be allowed for use on exams. We use the basic list of FE permitted calculators (for more information see http://ncees.org/exams/calculator-policy/ (Links to an external site.)Links to an external site.), but also allow other comparable models.

COMMUNICATION

Delivery of Course Information: You are responsible for keeping track of information related to this course. The three primary ways I'll convey course logistical information in this course will be:

- This Canvas Website (including the Calendar, Modules, and Assignments)

- Messages sent via the Canvas
  - You need to check your Notification Preferences and can even get Notifications sent via text message.
- In-class announcements, notes, and verbal discussion.

Communicating with Dr. Baker & his team: Please use the following guidelines insure streamlined and documented communication with Dr. Baker & his team:

- Make emails concise and complete. In every email include your course, section and full name. For problem based questions include the problem number as listed on the assignment.
- Please contact your grader *first* for all Homework and Learning Exercise grading questions.
- Please submit all exam grading inquiries to Dr. Baker via email - within one week of the return of the exam. Include a photo or scan of the entire problem in question.
- Note that comments submitted with Canvas assignments are only viewed by the grader of that individual assignment and should NOT be used as a means of communicating with Dr. Baker.

UNIVERSITY CALENDAR

You are expected to keep track of important course dates related to enrollment. Dates for adding, dropping, and withdrawing from this course can be found on the CSU Academic Calendar (Links to an external site.)Links to an external site..

ACADEMIC INTEGRITY

This course will adhere to the Academic Integrity Policy (Links to an external site.)Links to an external site. of the Colorado State University General Catalog and the Student Conduct Code (Links to an external site.)Links to an external site.. A good summary can be found in this list of Student Responsibilities (Links to an external site.)Links to an external site..

I know that solutions to textbook problems are available on the internet. Copying all or part of an assignment from the solutions or a fellow student's assignment is considered cheating and will earn you a zero on the assignment(s), prevent you from learning anything from the assignment, and lose the trust of Dr. Baker. All cases of cheating are seriously evaluated and could result in you failing the class or removed from the university.

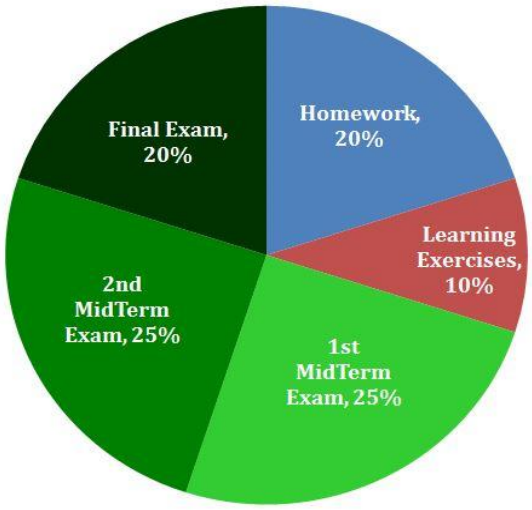
WORKING TOGETHER

You are encouraged to work alongside your peers on homework assignments, **but each student is responsible for completing in their own assignments**. The interaction of teaching and learning among a group is a powerful way to learn. However if you ever find yourself copying work that is not yours - STOP and reevaluate.

COURSE GRADING

Your current weighted grade will always be available on Canvas Grades. Assignments and exams will be weighted as follows:

- Homework 20%
- Learning Exercises 10%
- MidTerm Exams (2 x 25%) 50%
- Final Exam 20%



Individual exams/assignments may be curved, but the class will not be curved overall. In general for hand and online grading, '✓' (a check mark) indicates correct work and an '**X**' indicates an error. Letter grades will be assigned on the scale below.

Grade	Range
A+	100 % to 96.5%
A	< 96.5 % to 92.5%
A-	< 92.5 % to 89.5%
B+	< 89.5 % to 86.5%
B	< 86.5 % to 82.5%
B-	< 82.5 % to 79.5%
C+	< 79.5 % to 76.5%
C	< 76.5 % to 69.5%
D	< 69.5 % to 59.5%
F	< 59.5 % to 0.0%

LATE AND RESUBMITTED ASSIGNMENTS

Each student is only allowed one (1) *unexcused* late or resubmitted assignment (Homework or Learning Exercise) each semester. Excused extensions will be granted for university or medical excused absences - if you contact Dr. Baker 24 hours in advance of the due date. A couple of additional notes:

- Due dates and times listed in Canvas are all for the Mountain Time zone and are absolute - a deadline is a deadline
- No assignments will be accepted after the Final Exam
- We keep track of any exceptions (late, resubmitted, or extensions) on our side of the grade book.

HOLISTIC GRADING

The grading approach used in this course is called Holistic Grading. You'll be graded on how close you came to (1) using the correct method, (2) showing all required work, (3) keeping work legible and organized, and finally (4) getting the correct answer. The rubric for this scoring is as follows (relative to an 8 point scale):

8/8 Everything is correct – Including answers, units, steps, and sketches.

7/8 Everything essentially correct –The right idea on all parts of the problem. Only small missteps resulting in small errors (even wrong final answers).

6/8 The student had generally the right idea, but made a notable misstep at one point. Show general knowledge, but had a small conceptual error or a minor computational error.

5/8 The student had some sense of what they were up to, but missed a key piece. - Much of the work is good, but there's a big piece wrong or missing.

4/8 There is some evidence of understanding, but the work, overall, isn't correct. An idea of where to start, or how to handle such a problem, but not followed through very well.

3/8 Most of the work is wrong, but there is something that is correct or insightful - Some work that correct, but the problem, overall, isn't correct.

2/8 The student may have started the problem, but either went way off base or only finished ¼ of the problem – Needs to be at least a section of correct work.

1/8 Something of value – Something correct—a formula, a vector... something!

0/8 Blank or completely off-base – A solution and process which is completely wrong.

GRADED CONTENT

EXAMS

Midterm Exam 1	Tuesday, February 27, 5:00-6:50pm	Johnson 222
Midterm Exam 2	Tuesday, April 10, 5:00-6:50pm	Johnson 222
Final Exam	Thursday, May 10, 7:30-9:30am	Clark A104

** As long as we are able to arrange large enough rooms, students from any section have the option of taking either final exam time. We will poll you near the end of the semester. No additional exam times will be offered.

There will be two 110 minute midterm exams and a 120 minute final exam. Exam material will be drawn from lectures and the textbook.

For students who cannot attend regular exams due to university related activities, serious illness, or family emergency (all with written validation); a makeup exam may be arranged. The instructor must be notified priorto the exam and no exceptions will be made without a legitimate reason and a timely arrangement.

An equation sheet (also posted to the Exam Materials Module) will be provided as part of the exam, but no additional materials are allowed.

Please submit all exam grading inquiries to Dr. Baker via email - within one week of the return of the exam. Include a photo or scan of the entire problem in question and the first page of the exam.

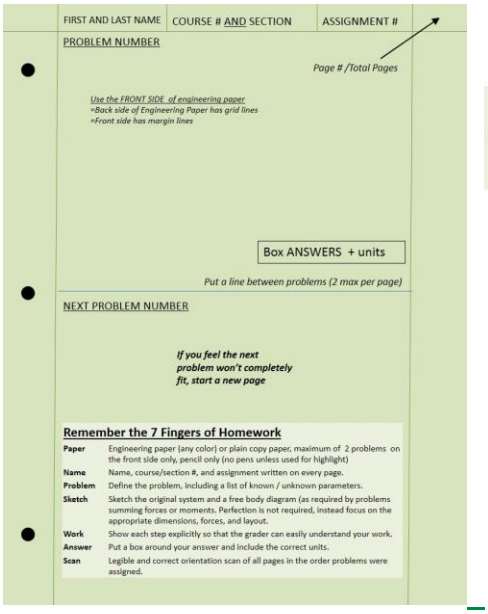
HOMEWORK

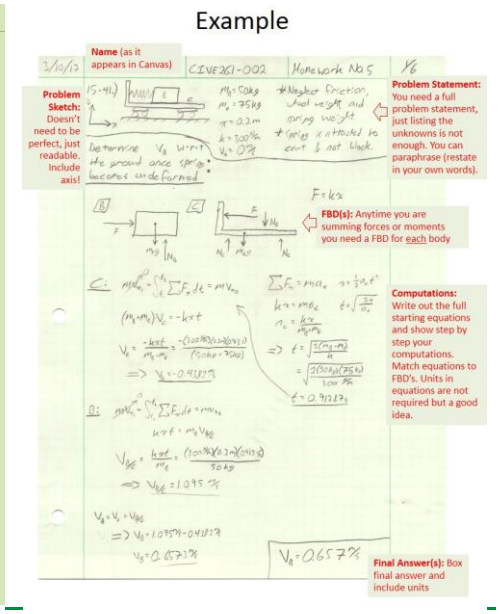
Each homework problem should be a self-contained representation of the entire problem and solution. You should be able to hand a student from another class your assignment and they would have enough information to understand what was asked, what you did to solve the problem, and what you found for an answer. As engineers we need to make sure out documentation is sufficient for others to follow our work. For the problem statement, simply listing the unknowns is not enough. You are welcome to paraphrase (restate in your own words) the problem statement.

All homework assignments are to reflect your original work and will be written by hand on paper or a tablet. While you are to complete your assignment by hand, the use of a calculator or computational websites/software are permitted for complex single calculations. When using a solver (calculator or computational websites/software) for complex calculations (e.g. the determinant of a matrix or the use of a polynomial or system solver) make sure to note which computations were done in the solver and include (1) what was input into the solver, (2) which function you performed with the solver, and (3) the output.

Additional Homework Details

1. All homework is to be hand written. If using pencil use either plain white copy paper or engineering paper. Alternatively you can use a computer tablet and stylus to hand-write your assignment.
2. Your homework is required to follow a specific format (as shown below). Homework not following this format will receive up to a 20% reduced score.
3. You are responsible for submitting a gradable file. Hence, illegible (i.e. upside down, unreadable scan, or super-sloppy) submissions will receive a zero.
4. ALL homework will be submitted digitally to Canvas as a *single* PDF file by 5pm on the Friday due date. There are multiple sheet feed PDF scanners in the Engineering computer labs (Links to an external site.)Links to an external site. and also in the library. You are also welcome to use scanning apps on your smartphone.
5. Only 2 of your homework problems each week will be thoroughly graded (8 points each). The others will be checked off for being complete (2 points each). The graded problems are randomly selected and are not an indication of importance and/or exam content. *Your lowest homework grade will be dropped*.





LEARNING EXERCISES

Learning Exercises will bring additional active learning into this course. They will be given either in class or as a take-home assignment on an approximately weekly basis. All will be completed in Canvas. Examples of learning exercise activities could include:

- Pre and Post Concepts Inventories
- Multiple Choice Quizzes
- Write to learn (e.g. fuzziest point, define the process, short summaries)
- Responses to real world problems

Learning exercises will be *typically* be posted on Wednesday and are due by the following Monday at 11:59 pm MT.

Your lowest learning exercise grade will be dropped.

Estimated Schedule

Date	Topic	Learning Objectives	Textbook
Week 1	Course Introduction & Syllabus	• Describe course policies and procedures • Recall Newton's three laws of motion. • Use consistent units and convert between different unit formats.	1.1 – 1.6
	Vectors and Units	• Explain the difference between a vector and a scalar. • Recall vector notation in the text and notes. • Recall rules for vector addition. • Compute components of vectors by multiple techniques	2.1 – 2.4
Week 2	Cartesian Vectors	• Review Cartesian vector notation (2D and 3D) • Explain why unit vectors are needed and how a unit vector is produced • Explain right hand rule and how it relates to coordinate systems • Use unit vectors to project forces onto a line.	2.5 – 2.8
	Vector Dot Products	• Use dot products to compute the projection of one force on another • Use dot products to find the angle between two vectors in space.	2.9
	Equilibrium of a Particle	• Explain how a pulley can be frictionless • Draw both a 2D and 2D free body diagram for a particle	3.1-3.4

Date	Topic	Learning Objectives	Textbook
Week 3	Moments and Cross Products	• Explain the sign convention for moment (right hand rule). • Use the cross product to evaluate 2-D moments	4.1 – 4.3
	Principle of Moments & Moment about an Axis	• Use Varignon's Theorem to compute the moment about a point • Demonstrate how 3D moments are similar to 2D moments • Compute the moment about a given axis	4.4 – 4.5
	Couples	• Calculate the moment produced by a force couple • Express a system of forces as a force-couple	4.6 - 4.7
Week 4	Force Systems	• Solve for resultants and components of 2-D force systems	4.8
	Free Body Diagrams	• Identify the forces provided by different kinds of supports • Draw FBDs using the forces from various types of supports • Write a set of rules or guidelines to help draw accurate FBDs.	5.1-5.2
	2-D Equilibrium	• Define static equilibrium. • Solve 2-D equilibrium problems • Define two-force and recognize two-force members	5.3-5.4
Week 5	3-D Equilibrium	• Define set of equations for 3D equilibrium • Explain why some support forces and moments are zero. • Find rectangular components of vectors in 3-D • Compute moments in 3-D	5.5-5.6
	3-D Equilibrium (cont.)	• Solve 3D equilibrium problems	
	External Statically determinacy	• Define the terms statically determinate and indeterminate • Explain constraint requirements for a stable system	5.7
Week 6	Trusses: Introduction & Joints	• Describe how a truss carries load. • List the assumptions made when analyzing a truss. • Distinguish between tension and compression	6.1-6.2

Date	Topic	Learning Objectives	Textbook
		• Use the method of Joints to compute truss bar forces.	
	Space (3-D) Trusses	• Apply the methods of joints for space trusses • Apply the method of sections for space trusses	6.5
	Review for Exam 1	• Describe the content and format of the upcoming Exam	
Week 7	Exam 1	• Office Hours in-class on Monday • Exam 1: Tuesday 5-6:50pm	
	Trusses: Sections	• Use the method of sections to find truss bar forces • Identify zero force members	6.3-6.4
	Frames & Machines	• Explain the definition, utility, and how to solve problems involving multi-force members	6.6
Week 8	Frames & Machines (cont.)	• Identify 2 force members among a multi-force member system	
	Go Over Exam 1	• Learn from your mistakes	
	Centroids & Integrals	• Describe the center of mass • Find the centroid of a function using an integral	9.1
Week 9	Composite Bodies	• Compute the centroid of regular and composite shapes using algebraic equations and composite bodies.	9.2
	Beams: External Effects	• Find the resultant of a distributed load. • Find the reactions for beams	4.9, 9.4
Week 10	V&M Diagrams	• Derive the differential relationships between distributed loading, shear, and bending moment. • Draw Shear and moment diagrams.	7.3
	V&M Wrap-up	• Get comfortable solving V&M diagrams	
	Intro to Friction	• Explain static, impending, and kinetic friction • Solve equilibrium problems including friction	8.1 – 8.2
Week 11	Friction: Slipping vs. Tipping	• Explain how to solve multi-movement friction problems	

Date	Topic	Learning Objectives	Textbook
	Friction: Wedges	• Solve equilibrium problems including the effect of friction on wedges	8.3
	Review for Exam 2	• Describe the content and format of the upcoming Exam	
Week 12	Exam 2	• Office Hours in-class on Monday • Exam 2: Tuesday 5-6:50pm	
	Friction: Screws	• Describe the action of screws and the moments to move them • Solve problems including screws	8.4
	Friction: Flexible Belts	• Describe the action of friction on flexible belts • Solve problems including flexible belts.	8.5
Week 13	Friction: Journal Bearings	• Derive and apply the fundamental equations to solve for Journal Bearings	8.7
	Go Over Exam 2	• Learn from your mistakes	
	Moment of Inertia (MOI)	• Explain the significance of the area MOI • Compute rectangular MOI using integrals	10.1 – 10.3
Week 14	MOI: Composite	• Use the parallel axis theorem to transfer axes. • Explain when you need to use the parallel axis theorem	10.4
	MOI: Products of Inertia	• Compute the area product of inertia using integration and composite areas	10.5
	Virtual Work	• Define Work and Virtual Work • Describe the different types of Virtual Work and equations for each	11.1 – 11.2
Week 15	Virtual Work	• Use virtual work to solve more equilibrium problems	
	Review & Evaluations	• Clearly understand what will be on the final exam • Complete course evaluations	
Week 16	Finals Week		