

ES220 – Statics, Section 02 MWF 10-10:50am CAMP 176

Who is teaching, and how can I find help?

Professor: Laurel Kuxhaus, PhD (“Dr. K.”), lkuxhaus@clarkson.edu

Office: CA2205 (near the bridge to the Student Center)

Office Hours: (Dr. K. – CA 2205): Monday 11am-1pm, Thursday 12-3 pm, Friday 11am-12pm, and by appointment.
(Graders – 207 CAMP): Sunday 3-5pm, Monday 1-3pm, Tuesday 3-5pm, Wednesday 1-3pm.

What is the purpose of this course, and what will we cover?

Course Objectives: Upon successful completion of this course, students will be able to:

- 1) Describe and explain principles of statics as applied to both particles and rigid bodies, including equilibrium. [ABET G]
- 2) Analyze, model, and interpret the results of static particle and rigid body problems using a vector analysis approach and free body diagrams.
 - Problem types include: determine equivalent force and moment systems; analysis of trusses, frames, and machines; computing centroids, centers of gravity, and moments of inertia; computing friction force vectors; drawing beam shear and bending moment diagrams. [ABET A, E, K]

Topical Outline: Selections from the following chapters will be covered, in the order specified on the Course Schedule:

- Chapter 1: Introduction
- Chapter 2: Statics of Particles
- Chapter 3: Rigid Bodies: Equivalent Systems of Forces
- Chapter 4: Equilibrium of Rigid Bodies
- Chapter 5: Centroids and Centers of Gravity
- Chapter 6: Analysis of Structures: Trusses, Frames, and Machines
- Chapter 7: Forces in Beams
- Chapter 8: Friction
- Chapter 9: Moments of Inertia

What materials do I need to succeed in this course?

Course Textbook: Vector Mechanics for Engineers: Statics; (9th Edition, ISBN 9780073529233; or 10th Edition, ISBN 0077491289 (Loose-leaf binder version) or 0077402286 (Hardcover version))

Course Website: Moodle will be used to post course information, including homework assignments and some class participation activities.

Other Materials (optional, but helpful!)

- A straight-edge (such as a protractor)
- Colored pens or pencils. *Many students find these helpful for diagrams, or calling attention to certain items.*

How will I know if I've met the Learning Objectives? (How will my grade be calculated?)

Grading, Assessment Methods, and Course Outcomes:

- 5 Exams (Exam 0 = 10%; Exams 1-4 = 12.5% each) [ABET A,E,G,K]
 - Exam structure and format will be announced in class.
 - Students must take all exams in order to pass the course.
- Final Exam: 25% [ABET A,E,G,K]
- Homework: 10% [ABET A,E,G,K]
- Attendance and Class Participation: 5%
 - Participation activities will be assessed via a combination of in-class activities and posts to Moodle. Each day's activity will be announced in class.
 - The minimum score will be (# activities completed)/39.

Minimum grading scale: *(this scale may be lowered, but will not be raised)*

99-100%: A+ (4.0)	87-89%: B+ (3.33)	77-79%: C+ (2.33)	60-67%: D (1.0)
93-98%: A (4.0)	82-86%: B (3.0)	70-76%: C (2.0)	
90-92%: A- (3.67)	80-81%: B- (2.67)	68-69%: C- (1.67)	below 59%: F (0.0)

Bonuses and Alternative Grading Methods:

A-on-Homework vs. Class Participation: If your homework average is an A (93% or higher) at the end of the semester, AND is greater than your attendance score, then your homework average will also count as your attendance grade. *That is, if you really can get an A on your homework without coming to class, then you will not be penalized for absences.*

Good Student Bonus: A bonus of 3 points will be added to your exam score if, for every homework assignment associated with that exam, you have earned an A (93% or higher) OR have redone the assignment by the next class period after the assignment was returned to you.

Other opportunities for bonus points may be offered at the discretion of the professor.

What expectations should I have about the logistics of this course?

Professional behavior is expected of all students (colleagues) in all matters related to this academic class.

Attendance at all classes is expected. Students should prepare for each class by reading the assigned section, as indicated in the Reading Schedule.

Exams:

- Exams will be closed-book and closed-notes. *CALCULATORS and other electronic devices ARE NOT PERMITTED.*
- Equation sheets and tables will be provided as needed.
- Leaving the room without permission during exams is prohibited.
- *Make-ups on Exams will be offered only with sufficient documentation of extenuating circumstances (see below).*

Extenuating Circumstances: *Extenuating circumstances are unexpected events which are beyond the student's control. Examples include bereavement, serious illness requiring hospitalization of the student, or other documented emergency.*

- Late work will only be accepted with documentation of extenuating circumstances. Dr. K. may ask the Dean of Students to verify the documentation.
 - Late work due to extenuating circumstances must be turned in to Dr. K. in person during office hours.
 - Students seeking adjustment of attendance points must submit a written request (email or paper).
- *Planned absences*, such as those for religious reasons, athletic events or other University-related business, generally do not merit an extension of the due date. *Assignments due during planned absences should be turned in prior to the due date.*
- In the event that a planned absence due to religious or other compelling reasons occurs on an exam day, students should contact Dr. K. *in advance*. The alternative exam may be different in both specific content and format from the exam given to the rest of the class.

Technology:

- Laptops, tablets, and cellphones are permitted for *class-related purposes only*.
 - To minimize distraction, only tablet-style computers may be used in the front of the classroom – other laptop users must sit in the very back row. *Note: Dr. K. may revoke this privilege for students who distract others, or who are not using their devices for course-related purposes.*
 - If there is an urgent situation that requires you to be reachable, please turn the ringer on your phone off and step out to the hall before answering.
- Email: Only messages from Clarkson.edu (or Potsdam.edu) addresses with “ES220” included in the subject line will receive a reply. To respect privacy regulations, grades cannot be discussed via email or phone.
- Recording lectures is prohibited without prior permission. All handouts and electronic files are copywritten by Dr. K. and may not be distributed or shared without prior permission.

Academic Honesty: Cheating or plagiarism of any sort will not be tolerated. Students are expected to be familiar with, and follow, the policies in Clarkson's Academic Regulations. At a minimum, any academic dishonesty will result in a grade of “0” of the assignment or exam and loss of any Good Student Bonus points earned. Suspicions of Academic Dishonesty may be referred to the Academic Integrity Committee for further review.

Accommodation: In compliance with Clarkson University policy and equal access laws, Dr. K. is available to discuss appropriate academic accommodations for students with disabilities. Requests for academic accommodations should be made during the first three weeks of the semester. Students seeking accommodation should register with the Office of Accommodative Services, located in the Student Success Center (110 ERC) to verify their eligibility.

How can I make the most of my Statics class experience?

The best to develop the skill of solving Statics problems is with regular practice. Homework assignments are designed to give you this practice.

- Homework assignments will be announced each day in class, posted to Moodle, and due at the next class period.
 - Homework due during a review session may be turned in at the exam.
- Homework must be neat, organized, and follow the Homework Guidelines (below).
- Students may work together to prepare assignments.
 - *Each student is expected to turn in her/his own work.*
 - *If you receive help from others, please note this on your homework.*
 - *e.g. you should write something like “Mary Smith explained how to draw the Free Body Diagram” on your paper.*
- Homework is due at the start of each class period.
 - Late students are expected to turn in their homework upon entering the classroom.
 - Students who are absent due to minor illness, travel, or other reasons may turn in their homework via email to Dr. K. – emails received before the end of the class period will be counted as on-time.
- Homework solutions will be posted to Moodle one week after the assignment is returned.
 - Solutions will be available during Office Hours prior to that date.
- Returned assignments and exams will be stored in folders labeled with each student’s name. It is the student’s responsibility to collect the graded assignments from these folders.
- Students are expected to keep all of the graded homework assignments and exams until the end of the course.

Homework Redo Policy: *To ensure mastery of material, students are encouraged to review and redo homeworks.*

- Redone homeworks may be turned in at any class meeting (or Exam) to the marked “Redo” folder. To ensure fair and accurate re-grading, redone homework problems must meet all of the following formatting requirements:
 - *Redo the whole problem.* Any redone problems must be COMPLETELY redone on a separate sheet of paper. *(This means each problem must start on a new sheet, but you do not need to redo all problems from a particular assignment.)*
 - Include a written explanation (minimum: one sentence) that describe the previous errors.
 - The following items must be *stapled* together, *in this order*:
 - Cover sheet (printed from Moodle, one per assignment)
 - Redone problems
 - All previous attempts of the assignment, with the most-recent attempt first.
- Deductions on Redos: *The best way to learn is to do homework right away and review homework as soon as possible. To encourage this, the following point deductions will be made on Redo assignments:*
 - -10 points – no attempt at the assignment by the original due date;
 - The minimum effort to qualify as a first attempt is: *Given* information, *Find* information, and some attempt at the Solution, for each problem of the assignment.
 - -10 points – First Redo of the assignment turned in after the next exam (see course schedule for specifics)
- *Redo assignments placed in the pile with regular homework, or that do not meet the formatting requirements, will be returned without grading.*

How should I format my homework?

- Write on one side of the page only! *(-20 if writing on the back.)*
- Jagged edges (e.g. those from spiral notebooks) must be removed. *(-20 if jaggy edges)*
- All diagrams must be neatly drawn and reasonably scaled. Engineering paper is suggested.
 - Leave space for grading comments!
- Please use dark (blue or black) ink or pencil for calculations. The use of color in diagrams is encouraged.
- Use a straight-edge to draw diagrams.
- Multiple pages must be stapled. *(-10 if no staple)*
- On the first page, list:
 - Your Name, Student number
 - ES220, Section number, HW#(assignment number)
- Each problem must have the following components: *Given, Find, Solution. (-20 if no "Given", "Find", or "Solution")*

Given:

- Provide the problem number from the textbook or homework handout.
- State the given information for the problem, including numerical values.
- Draw a picture (**use a straight edge** and draw it roughly to scale).

Find: State what you must determine.

Solution:

- Briefly state your solution process, then solve the problem.
- This may include diagrams of individual pieces or parts.
- Indicate the positive direction for summing forces and moments:
$$\rightarrow +\Sigma F_x = 0, \quad \uparrow +\Sigma F_y = 0, \quad \curvearrowright +\Sigma M_A = 0.$$
 - Be sure to indicate which point you are summing moments about (e.g., point A).
- Use the proper process for using equations to calculate answers:
 - Write the relevant equation(s) *in symbolic form*
 - Write the equation(s) again, *substituting* the given values
 - Substituted values should be in units to cancel properly, or conversion factors should be included in the substitution
 - Calculate the answer
- Keep track of units to make sure they cancel properly.
- Sanity-check your answer – does it make sense?

Answer:

- *Box the answer*, including the units. *(-5 per problem if no boxed answers)*
- Use the proper number of *significant digits*. The textbook suggests 4 digits if the number starts with a one, otherwise 3 digits. For example: 15 becomes 15.00 and 4.98345 becomes 4.98 *(-5 per item if incorrect significant digits)*

Grading

- Each assignment will be graded out of 100 points total.
- Small deductions will be made for small mistakes within a correct solution process.
- Large deductions will be made for incorrect solution processes, regardless of the final answer.
- ***All work must be shown in order to receive full credit for the answer.***

Schedule

ES220
Spring 2015

Exam Dates (NOTE EVENING TIME!) CAMP 177

Thursday, January 22nd, 8:30pm
Tuesday, February 3, 8:30pm
Thursday, February 19, 8:30pm

Thursday, March 12, 8:30pm
Thursday, April 9, 8:30pm
Final Exam TBD

Monday	Wednesday	Friday
	<i>class date --></i> <i>book chapters (read before class) --></i> <i>topic to be covered in class --></i>	9-Jan 1.1-1.6; 2.1-2.5 Intro; Vectors; addition and resolution of forces; resultants
	<i>homework due --></i> <i>homework assigned --></i> <i>homework to be returned --></i> <i>topics to review before class --></i>	HW 1 assigned <i>review: units, laws of sines and cosines</i>
12-Jan 2.6-2.8 Resolution of forces, rectangular components; intro to unit vectors	14-Jan 2.12-2.14 3D unit vectors; Forces in 3D space; components; addition	16-Jan 3.1-3.8 2D rigid bodies, external/internal forces; transmissibility; equivalent forces; vector product; rectangular components of a moment; free body diagrams
HW1 due HW2 assigned	HW2 due HW3 assigned HW 1 returned <i>review: cross product</i>	HW3 due HW 4 assigned HW2 returned
19-Jan 3.1-3.8 3D rigid bodies, external/internal forces; transmissibility; equivalent forces; vector product; rectangular components of a moment; free body diagrams	21-Jan 3.9-3.11 mixed triple product; moment about an axis; Review for Exam 0	23-Jan 3.12-3.16 Moment of a couple; equivalent couples; addition, vector representation, resolution.
HW4 due HW5 assigned HW3 returned <i>review: dot product</i>	HW5 due at exam HW6 assigned HW4 returned	HW6 due HW7 assigned HW5 returned
26-Jan 3.17-3.19 Reduction of force systems; equivalent systems	28-Jan 3.20. Equivalent Force Systems; Last topic for Exam 1	30-Jan Review for Exam 1
HW7 due HW8 assigned HW6 returned	HW8 due HW9 assigned HW7 returned	HW9 due HW10 assigned HW8 returned
2-Feb 2.9-2.11 Particle equilibrium; Newton's 1st; FBD	4-Feb 2.15 Particle Equilibrium in 3D	6-Feb 4.1-4.4 Eq'bm of rigid bodies; FBD; reactions at supports; 2D eq'bm
HW 10 due at exam HW 11 assigned HW 9 returned	HW 11 due HW12 assigned	HW 12 due HW 13 assigned HW 10, 11 returned
9-Feb 4.5 Statically indeterminate reactions	11-Feb 4.6-4.7 Eq'bm of 2-force body; of 3-force body	13-Feb NO CLASS - February Break
HW 13 due HW 14 and 15 assigned HW 12 returned	HW 14 due (HW 15 already assigned) HW 13 returned	

Exam 0
no-penalty redo expires: HW1-4

Exam 1
no-penalty redo expires: HW5-9

16-Feb 4.8-4.9 3D eq'bm; reactions at supports		18-Feb Review Ch. 4/For Exam 2	Exam 2 no-penalty redo expires: HW10-15	20-Feb 6.1-6.4 Trusses, method of joints.
HW 15 due HW 16 assigned HW 14 returned		HW 16 due at exam HW 17 assigned HW 15 returned		HW 17 due HW 18 assigned
23-Feb 6.5, 6.7 Joints under special loading conditions; trusses; method of sections		25-Feb 6.9-6.11 Frames, structures with multi-force members		27-Feb Review Frames
HW 18 due HW 19 assigned HW 16, 17 returned		HW 19 due HW 20 assigned HW 18 returned		HW 20 due HW 21 assigned HW 19 returned
2-Mar Truss and Frame Problems		4-Mar 6.12 Machines		6-Mar Chapter 6 Machine Problems
HW 21 due HW 22 assigned HW 20 returned		HW 22 due HW 23 assigned HW 21 returned		HW 23 due HW 24 assigned HW 22 returned
9-Mar Chapter 6 Machine Problems (Last topic for Exam 3)		11-Mar Review for Exam 3	Exam 3 no-penalty redo expires: HW16-24	13-Mar 5.1-5.5 Center of gravity of 2-force body; centroids; composite plates and wires
HW 24 due HW 25 assigned HW 23 returned		HW 25 due at exam HW 26-27 assigned HW 24 returned		HW 26 due (HW 27 already assigned)
16-Mar NO CLASS - Spring Break		18-Mar NO CLASS - Spring Break		20-Mar NO CLASS - Spring Break
23-Mar 5.6-5.7 Centroids by integration; Pappus-Guldinus Theorems		25-Mar 5.10-5.12 Center of Gravity in 3D; composite bodies; determination by integration		27-Mar Intro to Moment of Inertia
HW 27 due HW 28 assigned HW 25, 26 returned		HW 28 due HW 29 assigned HW 27 returned		HW 29 due HW 30 assigned HW 28 returned
30-Mar 9.1-9.5 Moment of inertia by integration; polar moment; radius of gyration		1-Apr 9.6-9.7 Parallel axis theorem; composite areas		3-Apr Chapter 9 problems: parallel axis theorem and composite area
HW 30 due HW 31 assigned HW 29 returned		HW 31 due HW 32 assigned HW 30 returned		HW 32 due HW 33 assigned HW 31 returned
6-Apr Chapter 9, structural steel (Last topic for Exam 4)		8-Apr Review for Exam 5	Exam 4 no-penalty redo expires: HW25-33	10-Apr 7.1-7.2 Internal forces in beams
HW 33 due HW 34 assigned HW 32 returned		HW 34 due at exam HW 35 assigned HW 33 returned		HW 35 due HW 36 assigned
13-Apr 7.3-7.5 Beam loading and supports; shear and bending moment diagrams		15-Apr Chapter 7 problems		17-Apr 8.1-8.4 Dry Friction; coefficients of friction; angle of friction;
HW 36 due HW 37 assigned HW 34, 35 returned		HW 37 due HW 38 assigned HW 36 returned		HW 38 due HW 39 assigned HW 37 returned
20-Apr Chapter 8 problems		22-Apr Chapter 8 problems and/or Review for Final		24-Apr Chapter 8 problems and/or Review for Final
HW 39 due HW 40 assigned HW 38 returned		HW 40 due HW 41 assigned HW 39 returned		HW 41 due (nothing assigned) HW 40 returned
Final Exam - Week of April 27 (no-penalty redo expires at exam for HW 34-41)				