

THE UNIVERSITY OF TEXAS AT AUSTIN
Department of Aerospace Engineering and Engineering Mechanics

EM 306 Statics
Summer 2019

SYLLABUS

UNIQUE NUMBER: 74825

TIME: MTWThF 3:00 - 4:30 pm

INSTRUCTOR: Gregory Rodin at gjr@oden.utexas.edu

Office Hours: MTWThF 4:30-5 pm right after the class or by appointment

TEACHING ASST.: Kirill Rebrov, kirill.rebrov@sbcglobal.net

Office Hours: MTWThF 12-1 pm

DISCUSSION

SECTIONS: TTh 5:00-7:30 pm

CATALOG DESCRIPTION:

Force systems, free-body diagrams; engineering applications of equilibrium, including trusses, frames, friction, distributed loads; vector algebra, centroids, moments of inertia. Three lecture hours and two discussion hours a week for one semester.

LEARNING OBJECTIVES:

To be able to analyze systems of forces and moments using free-body diagrams and to solve problems involving rigid bodies in equilibrium, including basic structure members such as trusses, frames, and beams.

PREREQUISITES:

Credit with a grade of at least C or registration for Mathematics 408D or 408L, and Physics 303K.

KNOWLEDGE, SKILLS, AND ABILITIES STUDENTS SHOULD HAVE BEFORE ENTERING THIS COURSE:

Basic geometry, trigonometry, and mechanics portion of college physics

KNOWLEDGE, SKILLS, AND ABILITIES STUDENTS GAIN FROM THIS COURSE:

Basic principles of equilibrium, analysis of forces and moments in statically determinate structures, free-body diagrams, distributed loads and friction, shear force and bending moment diagrams in beams.

IMPACT ON SUBSEQUENT COURSES IN CURRICULUM:

The topics of this course are basic engineering subjects that must be understood by anyone concerned with structures and materials. The course is an essential prerequisite for subsequent courses, EM 311 and EM 319.

RELATIONSHIP OF COURSE TO PROGRAM OUTCOMES:

This course contributes to the following ABET Criterion 3 outcomes and those specific to the EAC accredited program.

Outcome	√	Outcome	√
a. An ability to apply knowledge of mathematics, science, and engineering	√	g. An ability to communicate effectively	
b. An ability to design and conduct experiments, as well as to analyze and interpret data		h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.	
c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.		i. A recognition of the need for and an ability to engage in life-long learning	
d. An ability to function on multi-disciplinary teams		j. A knowledge of contemporary issues	
e. An ability to identify, formulate, and solve engineering problems	√	k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	√
f. An understanding of professional and ethical responsibility			

ABET PROGRAM CRITERIA ACHIEVED:

Program criteria are unique to each degree program and are to be compiled from the program criteria given for each degree program and listed in table format below. The faculty should check which of the program criteria are achieved in the course.

Criterion	√	Criterion	√	Criterion	√
A. Aerodynamics		G. Orbital Mechanics		M. Preliminary/Conceptual Design	
B. Aerospace Materials		H. Space Environment		N. Other Design Content	
C. Structures	√	I. Attitude Determination and Control		O. Professionalism	
D. Propulsion		J. Telecommunications		P. Computer Usage	
E. Flight Mechanics	√	K. Space Structures	√		
F. Stability and Control		L. Rocket Propulsion			

TOPICS:

1. Introduction to basic concepts and conventions (2 lectures)
2. Forces and moments in two dimensions (2)
3. Equilibrium in two dimensions (3)
4. Two-dimensional structures (4)
5. Beams: distributed loads, shear forces and bending moments (4)
6. Friction (2)
7. Forces and moments in three dimensions (3)
8. Equilibrium in three dimensions (4)
9. Center of mass and centroids (1)
10. Area moments of inertia (1)

PROFESSIONALISM TOPICS: None

DESIGN ASSIGNMENTS: none

Laboratory Assignments: none

Computer: none

PREFERRED TEXT: See instructions for online purchasing

ALTERNATIVE TEXT: Bedford and Fowler, Statics, 5th Edition

VIDEOS: Every week several videos will be posted on youtube: search for “Gregory Rodin EM306”. The videos usually focus on more difficult problems, that you are expected to master by the end of the course.

CLASS FORMAT

- All communications will be done using Zoom via a document camera.
- For security reasons, you must login into Zoom with valid UT credentials.
- All class meeting will be recorded and posted on the cloud.
- Each week there will be five lectures, one discussion session, and one exam.
- Each lecture will discuss concepts and demonstrate problem solving procedures.
- Each discussion session, led by the TAs on Tuesdays from 5:00-7:00 pm, will cover more examples and answer questions you may have.
- Each exam will be held on Thursday 5:00-7:00 pm.

HOMEWORK POLICY

- Every day you will be assigned several homework problems. You must post your solutions by 3 pm next day on **Gradescope**.
- Homework problems may be graded, so it is imperative that you solve them.
- Use of Chegg and similar unsavory resources is **CHEATING**.
- The only authorized internet resources are those posted on Canvas. You are welcome to use any book, including the one recommended for the class. If in doubt talk to me.
- Homework will be graded, but indirectly, as I reserve the right to replace weekly exam problem(s) with homework problem(s) of my choice.

EXAM POLICY

- All exams will be closed books and notes.
- Basic formulae will be provided.
- Calculators are allowed.
- No make-up exams will be given.
- The final exam will be comprehensive and conducted in accordance with the university schedule.
- Solutions must be posted on **Gradescope** before the deadline.
- You must have a web camera so that I can monitor you during the exams. No exceptions.

GRADING POLICY

- All grading issues **must not** be discussed with the TA.
- Exams should be treated as professional reports.
- It is your responsibility to present your solutions in an intelligible and clear manner, including good handwriting. The grader is allowed to take away points for poor presentation, which will be non-negotiable.
- Exam grades are not discussed, but you can request by sending me an e-mail within 24 hours after the grades are posted. Make sure to compare your solution with the posted one first.
- Each weekly exam will consist of three problems. When I grade your exam, I reserve the right to replace any of those, one and all are included, with homework problem(s) of my choice.
- The final exam is not subjected to regarding.
- The letter grade is nonnegotiable.
- Attendance of classes is required but not used for grading.
- Plus/minus grades will NOT be assigned for the final grade.

GRADING COMPONENTS

- Weekly exams: 60% (15% each)
- Final exam: 40%

GRADING SCALE

- A: a weighted total score above 90
- B: a weighted total score between 80 and 90
- C: a weighted total score between 60 and 80
- D: a weighted total score between 50 and 60
- F: a weighted total score below 50

SCHOLASTIC DISHONESTY

Scholastic dishonesty will not be tolerated and will be prosecuted to the fullest extent. You are expected to have read and understood the current issue of General Information Catalog, published by the Registrar's Office, for information about procedures and about what constitutes scholastic dishonesty.

SPECIAL NOTES:

The University of Texas at Austin provides upon request appropriate academic adjustments for qualified students with disabilities. For more information, contact the Office of the Dean of Students at 471-6259, 471-4641 TDD or the College of Engineering Director of Students with Disabilities at 471-4321.

EVALUATION:

The Measurement and Evaluation Center forms for the College of Engineering will be used during the last week of class to evaluate the course and the instructor.

Prepared by: Gregory Rodin

Date: June 2, 2020