The Cooper Union for the Advancement of Science and Art

Albert Nerken School of Engineering

ME103: Statics (2 credits)
ME104: Measurements Lab (1 credit)
Spring 2025

(these courses are to be taken concurrently)

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Office Hours: posted and by appointment. Communicate by TEAMS Chat (preferred) or Email.

ME103 Course Description: This foundation course develops a sound problem solving methodology, basic laboratory experience and technical communication skills based on engineering applications that involve forces acting on non-accelerating structures. Topics include equivalent system of forces; equilibrium; moments and couples; centroids and distributed forces; forces in structures (trusses, frames, machines); friction forces. Laboratory modules focus on the measurement of force from both mechanical and electrical signals.

ME104 Course Description: The course, taken concurrently with Statics, includes laboratory modules that focus on the measurement of force from both mechanical and electrical signals. Students develop laboratory and technical communication skills.

ME103 Schedule: Room 506. Monday. 2-4 pm.
ME104 Schedule: Room 106: Wednesday: A 2-3, B3-4, C4-5pm.

ME103 Grading: Quizzes~25%, Final Exam ~25%; Homework~40%, Class Attendance 10%
ME104 Grading: Weekly in-class workshops and completion of tasks.
Instructor Prerogative (IP) will be considered if final grade is borderline.

Course Structure: The weekly structure of the 2 courses consists of a 2 hour lecture period (ME103) and a 1 hour lab (ME104). The lecture period is focused on the development of a working knowledge of theoretical aspects of the forces that act on physical structures in equilibrium (that is, they are static). The lab period is designed as an introduction to electronic measurement methods, focused on measuring force (load cell). Labs are designed to be completed in class with minimal time required outside. However, you may need to spend some time outside if you are not able to complete the tasks during the Lab period.

Text: "*Engineering Statics: Open and Interactive*", by Daniel W. Baker and William Haynes, licensed under a Creative Commons Attribution-Non Commercial-Share Alike 4.0 International License. Interactive text available at: https://engineeringstatics.org
Non-interactive PDF available at: https://engineeringstatics.org/pdf/statics.pdf
Both found at https://open.umn.edu/opentextbooks/textbooks/1047

Supplemental Texts:
"*Introduction to Statics and Dynamics*" by Andy Ruina and Rudra Pratap.
Download text from http://ruina.tam.cornell.edu/Book/
"Schaum's Outline of Engineering Mechanics: Statics" 7th edition, by Merle Potter, E. Nelson, Charles Best and William McLean. McGraw Hill. ISBN 978-1260462883.

Reading Schedule: A reading schedule is listed. Lectures are designed to supplement, not regurgitate, the reading. Therefore, not all required topics will be directly addressed during the limited lecture time and many concepts will be introduced in class in a different order than are in the reading. Reading the required sections develops your technical reading skills. It also gives a broad exposure to this subject matter, which is at the core of Engineering practice. It is advised that you complete an initial reading (perhaps with incomplete comprehension) prior to class that week. Then iterate between working on assigned problems and re-reading appropriate sections.

READING SCHEDULE (Subject to Change)

READING SCHEDULE			Required Readings	Supplemental Readings		
week	date	Topic	Baker & Haynes	Ruina&Pratap	R&P Deep Dives	Schaum's
1	27-Jan	Intro & Vector Addition	Ch1: Ch2.1,2,3,5,6: Ch3.1,2	Ch 0.1: 1.1,2	Ch 0.2,3	Ch1
2	3-Feb	FBDs and Dot Products	Ch2.7: Ch3.3	p.132-134	Ch 2.1, Ch 4	Ch2
3	10-Feb	Particle Equilibrium	Ch 2.4: Ch 3.4, 5	p. 145-146, 156-160, 5.1	Ch 2.2	Ch3
	17-Feb					
4	24-Feb	Dry Friction	Ch 9.1	Ch 2.3, 5.2, 5.3	Ch 1.3-5	Ch4
5	3-Mar	Cross Product/Moments	Ch 2.8: Ch 4	Ch 5.4, 5		Ch5
6	10-Mar	2D Rigid Body	Ch 5	Ch 1.3_Samples		Ch6
7	12-Mar	3D Rigid Body		Ch 5.3		
8	17-Mar	Trusses (Joints)	Ch 6.1-4	Ch 6.1		Ch7
9	24-Mar	Trusses (Sections)	Ch 6.5	Ch 6.2	Ch 6.3	Ch8
10	31-Mar	Frames & Machines	Ch 6.6	Ch 6.4	Ch 6.5	Ch9
11	7-Apr	Friction	Ch 9.2-7	Ch 7.1		Ch10
	14-Apr					
12	21-Apr	Center of Mass	Ch 7.1-5, 8, 9	Ch 7.2		Ch11
13	28-Apr	Internal Forces	Ch 8.1-3	Ch 7.3		Ch12
14	5-May	Practice				
15	12-May	FINAL EXAM				

Problem Solving: A grasp of engineering subject matter is generally solidified through problem solving. Therefore, spend a large percentage of your time outside of class working out problems. It is generally advised to work a few hours most days of the week (rather than 8 hours in one day) on a combination of reading and working out problems related to the current content. This principle applies to most of your courses. A given problem need not necessarily be solved in a single sitting. A good learning strategy is to develop an iterative approach in which you work a problem until you are stuck, then leave it alone (to study other courses). Do not refer to posted solutions at this time. Your brain will subconsciously work on it, and then when you return to the problem you may experience that "AHA!" moment next time you look at it. Practice problems will be posted regularly to help build this skill. Regular HW problems will be assigned and collected, usually submitted in an electronic format on TEAMS

"Throw Away Your Calculator": The solution of back of chapter problems invariably #INcalculator of some form. For this course, whenever you find yourself reaching for a calculator, open a computer program instead. Both EXCEL and PYTHON will be emphasized as platforms. A basic format (with room for variation) will be demonstrated that involves separate sections for "Input Parameters", "Derived Parameters", "Results". For PYTHON, download the package from https://www.anaconda.com/products/distribution and familiarize yourself with the Spyder IDE and Jupyter notebooks.

Homework Policy: Homework problems (assigned through TEAMS) are generally due at the beginning of the lecture class period and based on content from the prior week's lesson. Some lecture time will be dedicated to solving problems. It is ultimately your responsibility to check the homework solutions which will be posted after they are due. You are encouraged to work with your peers on homework (which naturally develops communication and teamwork skills) but you must turn in your own work that reflects your understanding of the material.

Exam Policy and the Honor Code: You may not consult with anybody during the Quizzes and Final Exam. They are closed book, but you may prepare 2 pages (front and back) of an equation sheet that you prepare. Submission of these exams will be your acknowledgement that you have adhered to this code.

Tentative Exam Schedule: Quizzes are possible any day. Final Exam –May 12

Course Policies

Collaboration Policy and Academic Integrity: The fundamental principle of academic integrity is that a student must fairly represent the source of the intellectual content of submitted work. Students (and faculty) are expected to adhere to this policy. Professionals are expected to always uphold standards of honesty and integrity. ASME, the Mechanical Engineering professional society, has adopted a code of ethics in this regard.

Except for quizzes or exams, students are encouraged to work together in this class to understand the homework assignments and develop communication skills. There is much to be gained in sharing the learning process, both in explaining a concept to a peer or having it explained to you in their words and interpretation. However, avoid the temptation to share solutions. There is a fine line between collaborating so that all parties build comprehension and character through the process of working out new material, and just one person getting the final result and sharing it with a colleague. For submitted work, it is expected that some sort of acknowledgement statement be included (i.e. "I worked with *** and consulted www.****)

Some examples are:

1. You discuss concepts, approaches and methods, which could be applied to a home assignment before starting your write-up. This process is encouraged. Written acknowledgment of this type of interaction is optional.
2. After working an assignment independently, you compare responses with another student which confirms your results and response. You should acknowledge that the other student's write-up was used to check your own.

3. After working an assignment independently, you compare responses with another student which alerts you to an error in your own work which you then correct. You should state at the end of your submission that you corrected your error after checking responses with the other student.
4. You and another student work through an assignment together and exchange ideas as the effort progresses. You both should state at the end of your individual submissions that you worked jointly.
5. You copy all or part of an assignment write-up from a reference such as a textbook or past solution (as opposed to developing the solution yourself and citing the reference). You must cite the reference. There is some educational value in reading and understanding the solution but would be much more beneficial to your growth if you write it in your own words.
6. You copy verbatim all or part of a write-up from another student. You must cite the person by name. There is limited value added in such an approach, so avoid this behavior.

Verbatim copying of any material which you submit for credit without reference to the source is considered to be academically dishonest.

Exam Policy and the Honor Code: Exams are to be conducted with no consultation with anybody, and you are on the honor code to do so. Submission of these exams will be your acknowledgement that you have adhered to this code.

Diversity And Inclusion Statement*:* The Cooper Union strives to create a learning environment that supports a diversity of thoughts, perspectives and experiences, and honors your identities (including race, gender, class, sexuality, religion, ability, etc.) To help accomplish this aim:

If you have a name and/or set of pronouns that differ from those that appear in your official records, please let us know.

If you feel the material presented in any way does not represent a diverse background of authors, presenters and experiences, or that we can do better to include diverse perspectives, please let us know.

If you feel like your performance in the class is being impacted by your experiences outside of class, please don't hesitate to come and talk with us. We want to be a resource for you. We may also be able to also help point you in the direction of other resources.

We (like many people) are still in the process of learning about diverse perspectives and identities. If something was said in class (by anyone) that made you feel uncomfortable, please talk to us about it.

As a participant in course discussions, you should also strive to honor the diversity of your classmates.

If you are struggling for any reason in this course, please reach out to your Professor.

Where to get help.

Problem	Resources
I'm struggling with the course material!	Your Professors are here to help you, but so are your fellow classmates. Here are some ways to get help with course material: • Ask questions during class • Come to Office Hours • Form a study group to work on homework • Post a message on Teams - your classmates can help answer too • Email or Teams Message your Professor
I need an extension on an assignment.	Ask your professor. If appropriate, an extension might be awarded. However, it is in your best interest to keep up with the work as well as you can. Communication is key.
I'm struggling with my mental health	These are hard times and your mental health is important. You are a person first and a student later. So take care of yourself. The Counseling and Mental Health Services (https://cooper.edu/students/student-affairs/health/counseling) is a great resource.
There's something else...	Please contact your Professor who can point you in the direction of resources that can help you if necessary. But your Professor can't help if you don't communicate, so don't hesitate to reach out!

The Core Values of the Albert Nerken School of Engineering (Appendix A) apply to multiple aspects of this course.

APPENDIX A

CORE VALUES

Our core values are the principles that guide our internal conduct and our relationship with the external world. Living these core values creates a culture within the Albert Nerken School of Engineering that supports students, faculty, and staff in all we do.

RESPECT

We treat others as they would have us treat them. We support the vigorous and open debate of ideas within a community marked by mutual respect.

INTEGRITY

We value ethical behavior, integrity, and transparency in all aspects of life. We respect others; conduct ourselves ethically, honestly, and openly; honor our commitments; and fairly resolve ethical issues.

DIVERSITY & INCLUSION

We are committed to Peter Cooper's radical commitment to diversity and value, living and working in a diverse community. We value, encourage, and promote all aspects of human differences, fostering a culture that embraces a broad variety of personal circumstances, experiences, perspectives, and opinions.

INTERDISCIPLINARITY

We value interdisciplinary approaches and the intersection of art, architecture, humanities, and engineering. We collaborate across disciplinary boundaries to create innovative solutions to societal challenges.

TEAMWORK

We embrace a developmental culture, one in which cooperation and collaboration are cornerstones. Our faculty, staff, and students are collaborative, supportive, and serve as role models and mentors for professional and personal growth.

FREE

We are committed to Peter Cooper's vision of a free center of learning.

SOCIAL IMPACT

Through our engagement we instill a sense of social justice that translates into action. We inspire members of our community to apply their expertise and leadership for the benefit of society and humanity.

PARTNERSHIP

We are an engaged partner with industry, academia, government, and the communities in which we live. We are an indispensable partner with New York City.