University of Illinois at Urbana-Champaign
Department of Mechanical Science and Engineering

TAM 210 - Introduction to Statics

TAM 211 - Statics

Course description

TAM 210 (2 hours): Forces, moments, couples; resultants of force systems; equilibrium analysis and free-body diagrams; analysis of forces acting on members of trusses, frames, etc.; shear-force and bending-moment distributions; Coulomb friction; centroids and center of mass; applications of statics in design.

TAM 211 (3 hours): Forces, moments, couples; resultants of force systems; equilibrium analysis and free-body diagrams; analysis of forces acting on members of trusses, frames, etc.; shear-force and bending-moment distributions; Coulomb friction; centroids and center of mass; moment of inertia, polar moment of inertia, and product of inertia; virtual work; hydrostatic pressure; applications of statics in design.

Prerequisites

PHYS 211; credit or concurrent registration in MATH 241.

Instructors

Dr. Mariana Silva
Email: mfsilva@illinois.edu
Office: MEB 154
Lectures: MWF, 12PM (AL1), GH 112
Office hours: Wednesdays, 2-3pm, MEB 248 (or by appointment)

Prof. Daniel Tortorelli
Email: dtortore@illinois.edu
Office: MEB 350
Lecture: MWF, 1PM (AL2), GH 112
Office hours: Mondays, 2-3pm, MEB 248 (or by appointment)

Teaching assistants

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Discussion sessions

ADA, M 3:00-3:50PM, 335 MEB, Tonghui + Chris
ADB, M 9:00-9:50AM, 335 MEB, Seunghwi + John
ADC, M 4:00-4:50PM, 335 MEB, Ali + Chris

ADD, T 9:00-9:50AM, 335 MEB, Namjung + Yoon
ADE, T 12:00-12:50PM, 335 MEB, Robin + Hyunjin
ADG, T 12:00-12:50PM, 241 EVRT, Namjung + John
ADJ, W 3:00-3:50PM, 335 MEB, Tonghui + Yoon
ADK, W 4:00-4:50PM, 335 MEB, Chris + Namjung
ADL, R 9:00-9:50AM, 335 MEB, Seunghwi + Yoon
ADM, R 12:00-12:50PM, 335 MEB, Robin + Ali
ADN, R 12:00-12:50PM, 241 EVRT, John + Hyunjin
ADO, F 9:00-9:50AM, 335 MEB, Robin + Ankit
ADP, F 10:00-10:50AM, 335 MEB, Ankit + Bruno
ADQ, F 11:00-11:50AM, 335 MEB, Ankit + Bruno
ADR, F 2:00-2:50PM, 335 MEB, Bruno + Hyunjin

Special accomodations

To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact their lecturer and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES you may visit 1207 S. Oak St., Champaign, call 333-4603 (V/TDD), or e-mail a message to disability@uiuc.edu.

Compass 2g

Your grades, class notes and general announcements will be posted on Compass 2g (https://compass2g.illinois.edu).

i>clicker

Quizzes will be administered in lectures via the i>clicker system. The i>clicker remote may be purchased at any of the book stores and must be registered on Compass 2g, under the tab "Register i>clicker". **You need to register your i>clicker by September 5th, when the i>clicker roster will be synced for the last time**.

Supporting material

We will provide lecture notes. They will available for downloading on Compass 2g.

The custom version of "*Statics*" by Hibbeler R.C., Pearson (ISBN: 9781256648680) can be used as SUPPLEMENTAL material and is available at UofI Bookstore ($\approx$ \$140.00). The package available at the bookstore includes the *MasteringEngineering* access code, which is required to complete your homework assignments (see section "Required online tool") and eText.

REQUIRED online tool - MasteringEngineering

Your online homework assignments will be available from the website www.masteringengineering.com. You should consider one of the following options to obtain access to MasteringEngineering:

1. Purchase custom textbook from the bookstore: MasteringEngineering + **eText** + printed custom version of the textbook
2. Purchase MasteringEngineering + **eText** (\$110.00)
3. Purchase MasteringEngineering only (\$55.00) - in this case, you may choose to use your lecture notes for text reference, borrow a book from a friend or library, or buy any other used textbook

Please follow the steps below to start using MasteringEngineering:

- Go to the website http://www.pearsoncustom.com/il/ui_eng_mech_statics
- Select one of the three options under the "Sign in" box on the top left of the page.

  - "Register Here" - if you purchased the printed version of the textbook from the bookstore (option 1 above)
  - "Purchase Access with eText" (option 2 above)
  - "Purchase Access without eText" (option 3 above)

- You will need to create a Login Name and Password.
- After you login for the first time, you will receive a Welcome Message. You will be asked to enter the Course ID: TAM210FA14
- You will also be asked to enter your UIUC NetID (which is the first part of your email address - NetID@illinois.edu). Make sure you type this information correctly, since it will be used to upload your grades into Compass 2g.

Study Hall

- A Study Hall in 429 Grainger Library is provided to answer questions you may have.
- Study Hall is intended to supplement the lectures and discussion sections.
- Do not ask the staff to work the homework problems before they are due. It is OK to ask them specific questions on the details of your attempted solutions or to work out problems that are similar to the homework problems.
- The Study Hall will begin on Wednesday, August 27th. It will be staffed by the TAs during the time slots indicated in Table 1.
- (*) Note that Dr. Silva and Prof. Tortorelli will hod their office hours at MEB 248 (NOT at 429 Grainger)

Table 1: Office hours at 429 Grainger Library

Time	Monday	Tuesday	Wednesday	Thursday	Friday	Sunday
2 - 3pm	Silva (*)		Tortorelli (*)			Christopher
3 - 4pm		Ankit	Bruno	Namjung		Christopher
4 - 5pm	Namjung	Ankit	Hyunjin	Namjung	Robin + Tonghui	
5 - 6pm	Hyunjin	Tonghui	John + Christopher	Bruno	Robin + Ankit	Hyung
6 - 7pm	Hyunjin + John	Tonghui	John + Robin	Bruno	Hyung	Hyung

Online Forum

This class uses Piazza https://piazza.com/illinois/fall2014/tam210tam211/home for ALL online questions and feedback. You will receive an invitation to join this forum. Official class announcements will be sent via Piazza, so you must register with an email address that you regularly check. You can also use the Search for Teammates feature on Piazza to help find a study group. TAs are scheduled to be checking Piazza everyday at the following times: 11am-12pm, 4pm-5pm and 9pm-10pm. The use of Piazza should not replace the Study Hall time, since some questions cannot be fully addressed via an online forum.

Online homework

1. You will find your online homework assignments on MasteringEngineering.
2. Online homework assignments will be due on **Mondays, Wednesdays and Fridays at 11:59 pm**. Late submissions will be penalized by 20% over each day late. Make sure to check the deadlines on MasteringEngineering.

3. Some of the problems will have a Hint. You can get bonus points if you choose not to open the Hint.
4. You can rework completed items after the due date. This work will not be saved and will not affect your grades.
5. Your HW score will also be uploaded on the Compass 2g grade book. Please make sure to check your grade book regularly for inconsistencies.
6. To encourage you to work through the problems and to obtain the correct solution you may revise and resubmit your solutions numerous times until the due date.
7. The online homework problems give explicit values and units to the relevant lengths, material properties, forces, et cetera, and therefore you should give your final answer with an explicit numerical value. Nevertheless, when solving a homework problem you should (to the utmost extent possible) assign symbols to all the relevant lengths, forces, material properties, et cetera, and then solve the problem symbolically. As a last step, you should substitute the value and units of each of the symbols in the symbolic formula. You are encouraged to solve all problems symbolically.
8. This symbolic form of working out the problems will be used by me in the lectures and by yourselves in the individual reports, worksheets and exams.
9. You are encouraged to print out each homework problem and derive your symbolic solution on this print out. Store these solutions for your future reference.
10. You should come to office hours with the symbolic solution for your online assignment. We will be able to check your work better if you have that in hand.
11. Solutions will not be posted.
12. Your first two assignments are due on August 29th. One of them is optional; its purpose is to help you getting familiar with "MasteringEngineering". You can earn up to 0.2% of extra points to be added to your final grade. The other one is required and related to the material covered in the first week of classes.

Discussion Group Activities

1. Most discussion sessions will consist of a group worksheet exercise, which is a high-energy and efficient 50-minute learning experience. In each session, students are randomly assigned to a group of three to four people. Each student must submit a completed worksheet, but only one randomly-chosen worksheet will be scored from each group, and every student in that group will be given that score.
2. Among other things, the TA will be evaluating team work, problem-solution skills and the correct interpretation of the problem.
3. There are two main goals for the discussion worksheets:
   - Gain experience in team-work. This skill is critical in all engineering disciplines, from large scale industrial projects to academic research. To work productively in teams is a skill that must be learned just like math or physics, and regular practice is essential. Often you will have to work with people who you do not especially like, or who you find it difficult to work with. It is important to learn how to manage these situations so that the important work is still accomplished.
   - Apply engineering concepts to real-world problems. Each worksheet focuses on a real-world problem that you will have to use your engineering skills to solve, including the material from class and also knowledge from previous engineering, math, and science classes. You will also have to think like an engineer and understand when to make approximations, how to judge the appropriateness of different models, and which mathematics and physics is most useful for a given engineering problem.
   - We also hope that these discussion worksheets will help you to meet your classmates, and we encourage you to get together outside of lectures and discussions to work collaboratively on homeworks and exam study.

4. Discussion sessions will begin on Monday, August 25th.

5. If you attend discussion sessions ADA, ADB or ADC (i.e., Monday discussions), you should go to any other discussion session on the week of September 1st, because of the Labor Day Holiday.

6. If you are more than 5 minutes late to a discussion session, then you will not be permitted to complete the worksheet.

7. You MUST attend the discussion session in which you are registered. You won't get any grade for the worksheet if you attend the wrong discussion (besides the second week of classes as explained in item 2).

Discussion Individual Report

1. To teach you how to prepare your analyses in a logical manner, you will be asked to submit an INDIVIDUAL assignment on a weekly basis. This assignment will come in two forms: i) based on the worksheet/activity that you started solving in your discussion session the week before or ii) solution of a standard textbook problem.

2. Scan your report and save it in pdf format. Files in any other format will not be graded.

3. While scanning make sure you scan all the pages of your written report in ONE pdf file. We will only grade a single pdf file.

4. Your scanned work must be in portrait format.

5. IN SUMMARY, WE WILL ONLY GRADE REPORTS UPLOADED AS A PDF FILE, SINGLE DOCUMENT, PORTRAIT FORMAT! NO EXCEPTIONS!!

6. You will upload your written reports on compass 2g. These reports are due on Fridays at 11:59pm.

7. You will have two attempts to upload your report and we will grade only your last attempt.

8. You can find more information on how to upload these reports on compass 2g.

9. Your name and discussion session number must be printed legibly on the top of the first page.

10. When preparing your report, you MUST assign symbols (to the utmost extent possible) to all the relevant lengths, forces, material properties, et cetera, and then solve the problem symbolically. If given, you should assign numerical values to your final result. Depending on the difficulty of the problem, you may assign numbers at intermediate steps.

11. These reports are designed to practice the communication of engineering concepts in writing. They will be graded based on presentation, neatness, correct use of symbols, quality of drawings and diagrams, clarity of explanation and correctness of the answer. Here is the point breakdown for the report:

    - Correct interpretation of the problem: 1
    - Correct final answer: 1
    - Presentation quality*: 2
    - Clarity of explanation: 1
    - Clear drawings and diagrams: 2
    - Use of symbolic work: 2
    - Use of units on numerical answers: 1

    *Your report should be neat and organized, hand-written using pen or typed.

12. In the first week of discussion, we will give you some tips on how to present a written document in engineering format.

13. Late report will not be accepted (you will not be able to upload it on compass 2g). No exceptions. PLEASE DO NOT SEND YOUR LATE WRITTEN REPORT BY EMAIL.

14. Your lowest report score will be dropped. *This drop should be reserved for unexpected occurrences such as sickness or a family emergency.*

Lectures

1. Prompt and regular attendance at lectures is required.

2. The lectures will be delivered on a Tablet-PC.

3. Lecture notes are uploaded on Compass 2g. You will have access to pre-lecture notes in advance. These notes have blank spaces for you to take notes. We encourage you to print and bring these to class. You will also have access to post-lecture notes, with the instructor's annotations from the lecture.

4. Quizzes (4%)

   (a) Expect an i>clicker quiz in every lecture: 3% for attendance + 1% for correct answer

   (b) Your three lowest scores will be dropped. *These drops should be reserved for unexpected occurrences such as sickness or a family emergency.*

Exams

1. Bring your student ID to the exam, and arrive with sufficient time to sign in.

2. A formula sheet will be provided at the exam.

3. The midterm exams are scheduled in the evening. According to the student code, students are to be excused from one or more regular class periods for an amount of time equivalent to that required for the evening examination. Instead of canceling classes, there will be two review classes during lecture time prior to each of the exams. These lectures are optional and therefore there will be no i>clicker questions on these days. Attendance is not required, but you may find it beneficial to attend.

4. Conflict exams will be scheduled for students with legitimate (documented) scheduled conflicts. These are usually on the same day but earlier than the regular exam. You should contact your instructor to schedule a conflict exam no later than one week prior to the exam date.

Midterms

(a) 2 hours exam, "closed book" and "closed notes".

(b) A formula sheet will be provided at the exam.

(c) Midterm 1: Thursday, October 2nd, 7:00PM-9PM, Location: TBA

(d) Midterm 2 (TAM 211 only): Tuesday, Nov 11th, 7:00PM-9PM, Location: TBA

(e) Report to the room indicated in the table below corresponding to the discussion session you are REGISTERED in!. You are not going to be allowed to take the exam in the wrong classroom. Bring your ID to the exam and show up early so you have time to sign in.

Final exam

(a) 3 hours exam, "closed book" and "closed notes".

(b) A formula sheet will be provided at the exam.

(c) Make-up exams will only be allowed with a major documented excuse.

(d) Final Exam (TAM 210): Tuesday, Nov 11th, 7:00PM-10PM, location TBA

(e) Final Exam (TAM 211 - AL1): Dec 17th, 7:00 - 10:00PM, location TBA

(f) Final Exam (TAM 211 - AL2): Dec 18th, 7:00 - 10:00PM, location TBA

Final grades

Table 2: Grading Distribution

	TAM 210	**TAM 211**
Online Homework	10%	10%
Discussion Group Activity	8%	8%
Discussion Individual Report	8%	8%
Lecture Quizzes	4%	4%
Midterm 1	30%	20%
Midterm 2	−−	20%
Final Exam	40%	30%

You total score corresponds to final letter grades as described in Table 3

Table 3: Final letter grade

97 - 100 A+	93 - 97 A	89 - 93 A-
86 - 89 B+	82 - 86 B	79 - 82 B-
76 - 79 C+	72 - 76 C	69 - 72 C-
65 - 69 D+	60 - 65 D	55 - 60 D-
	0 - 55 F	

Grading generalities

1. Questions about your grades must be made within the week after the quiz, exam or HW is returned. Discuss the issue with the TA who graded the problem in question.
2. Questions about missing quiz/exam/HW grades must be addressed to the Super-TA Joel Krehbiel (jkrehbi2@illinois.edu) within the week after the quiz/exam/HW was returned to your class-mates. Make sure to routinely check your grades on compass.

Absences and excused grades

1. Excuses from homework, quizzes and exams will be given only in one of the following circumstances:
   (a) illness;
   (b) personal crisis (e.g. automobile accident, required court appearance, death of a close relative, weather conditions which make it impossible to get to the university); and
   (c) required attendance at an official UIUC activity (e.g. varsity athletics, band concert).
2. In all cases you must complete the "TAM Excused Absence Request Form" (https://illinois.edu/fb/sec/411728) and upload a scan of the official written documentation explaining your absence.
3. In cases (a) or (b) an official excuse letter from the Dean on Duty (http://www.odos.uiuc.edu/deanonduty/)must be submitted via the online form within 2 weeks of the due date of the missed assessment, but no later than reading day. In cases of extended or unusual illness, late submission of excuse documentation will be considered.
4. In case (c) an official letter from the designated university official must be submitted via the online form at least one week prior to the due date of the missed assessment.
5. The dropped homework and quiz grades are intended for excused absences. If additional homework and quizzes are excused, then each such approved excuse will increase the number of grades that will be dropped.

6. An excused absence from a midterm exam will receive the score EX. At the end of the semester, midterm-exam EX scores will be replaced by a weighted average of your non-EX exam scores (midterm-exams and the final exam).

7. When possible, you will be required to attend another discussion section rather than miss your scheduled discussion section for one of the aforementioned circumstances. In this situation please contact the Super-TA Joel Krehbiel (jkrehbi2@illinois.edu), so you don't get penalized on your HW assignment.

Effective use of email

Email is most useful when you need to report a problem or request an appointment. But it is hard to discuss concepts, equations, plots or diagrams by email. If you have difficulties solving your homework or understanding a theoretical point, talk to one of us in person during office hours or post messages on Piazza.

Academic integrity

Infractions will not be tolerated. See the University's Student Code, Article 1, Part 4.

Biography

Prof. Tortorelli Vita: I am originally from Des Plaines, IL and attended St. Stephen Protomartyr Catholic Grade School (now Our Lady of Destiny) and Maine West High School. From there I enrolled in the University of Notre Dame where I received my BSME in 1984. Immediately following this period I entered the graduate program at the University of Illinois in Urbana-Champaign where I obtained my MSME in 1985. The next stop was a one year stint at the General Motors Technical Center where I worked in an advanced engine design group. From there I returned to Illinois and received my PhD in 1988. I returned to the advanced engine design group at GM for two more years before I joined the faculty at Illinois in 1990.

In my research I apply finite element and multibody dynamic analyses and design sensitivity analysis to optimize a variety of systems, e.g. structures, castings, polymer dies, and rigid body mechanisms. My other interests include fishing, camping, sailing, water skiing, and basketball, but mostly biking, woodworking and cooking these days. You can find me riding with the IBRC on occasion.

Dr. Silva Vita: I am originally from Rio de Janeiro, Brazil. I received my BSME and MSME from the Federal University of Rio de Janeiro, Brazil and later joined the University of Illinois at Urbana-Champaign in 2003 as a graduate student. I obtained my PhD in Theoretical and Applied Mechanics in 2009. I was a post-doctoral research assistant for one year after that. Since then, I have been teaching TAM courses in the department of Mechanical Science and Engineering. I also work as an academic advisor in the Undergraduate Programs Office in the same department. In addition to enjoy teaching and interacting with students, I like to dance salsa (was an instructor for many years) and spend time with my beautiful daughter Julia.