MAE 1312-003
Engineering Statics
Fall 2017
9/28/17 rev (c)

Instructor: Dr. Baxter R. (Bob) Mullins, Jr., P.E.

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Office Hours: MWF 9:00 – 10:00 AM, TT 4:00 – 5:00 PM (other times by prearranged appointment)

Section Information: MAE 1312-003

Time and Place of Class Meetings: TT 5:30PM-6:50PM, WH Rm #208

Description of Course Content: A study of forces and force systems, resultants and components of force systems, forces due to friction, conditions of equilibrium, forces acting on members of trusses and frame structures, centroids and moments of inertia. Vector and index notation introduced.

The course content will include:

1. Problem Solving Methods and Processes
2. Mechanics
    a. Newton's Laws of Motion
    b. Vectors and Vector Systems
    c. Forces and Force Vectors
3. Equilibrium of a Particle
    a. Concept of a Particle
    b. Conditions for Equilibrium
    c. Free-Body Diagrams
4. Force System Resultants
    a. Forces and Moments
    b. Resultants verses Reaction Forces and Moments
    c. Couples and Moments
5. Equilibrium of a Rigid Body
    a. Concept of a Rigid Body
    b. Concept of Equilibrium
    c. Free-Body Diagrams
    d. Equilibrium and Constraints
6. Structural Analysis
    a. Concept of a Truss
    b. The Method of Joints
    c. The Method of Sections
    d. Zero-Force Members
7. Internal Forces
    a. Concept of Tension and Compression
    b. Concept of Internal Forces

   c. Shear and Bending Moment Diagrams
8. Friction
   a. Concept of Friction – Static and Dynamic
   b. Practical Friction: Wedges, Screws, Belts, etc.
   c. Rolling Friction
9. Center of Gravity and Centroids
   a. Concepts of Centroids, Center of Mass, and Center of Gravity
   b. Composite Bodies
   c. Distributed Loading and Fluid Pressure
10. Moment of Inertia
   a. Concept of Moment and Product of Inertias
   b. Parallel-Axis Theorem
   c. Mohr's Circle for Inertia
   d. Inertia for a Composite Area and Mass
11. Virtual Work
   a. Concept of Virtual Work
   b. Conservative Forces
   c. Potential Energy
   d. Stability

Every day "Rules-of-Thumb", will be presented and discussed throughout the semester.

Theory formulation, variable definition, analysis procedure and results presentation will follow industry standards. This shall include standard industrial practices developed by national and international agencies including ISO, Six Sigma, government (e.g., FARS, MIL STD) and professional organizations (e.g. AIAA, SAE).

Prerequisites: C or better in each of the following MATH 1426 (or HONR-SC 1426) and PHYS 1443; C or better in MAE 1312; C or better in MATH 2425 (or HONR-SC 2425).

Description of Course & Structure: As one of your first courses in the engineering education portion of your degree plan, the format of **MAE 1312 Engineering Statics** course will be somewhat different than what you have experienced in your sciences and mathematics courses. This course is structured to provide the student the necessary fundamentals of solving engineering problems with an "industrial perspective" of the material and its use in that environment. The instructor will be your "customer/client/manager" and you, the student, are the "engineer" providing the requested analysis and presentation of the results in an organized manner based on standard practices and processes. The intent is to prepare the student to quickly perform at a high level in industry upon graduation. To that end there are very specific processes to be followed and an expected quality of work products.

Student Learning Outcomes: To present the principles of engineering mechanics as it pertains to engineering statics and to the study of forces and force systems, resultants and components of force systems, forces due to friction, conditions of equilibrium, forces acting on members of trusses and frame structures, internal forces, centroids and moments of inertia, and to introduce the mathematics of vectors and index notation.

Required Textbooks and Other Course Materials

- ***Engineering Mechanics - Statics*** (w/out Mastering Edition) by R.C. Hibbeler, 14th ed., ISBN:9780133918922

- Engineering Paper (Pad), Drawing Tools (ruler - 6" will suffice, protractor, compass)

References

- Calculus Textbook
- Physics Textbook
- Nelson, E., et al., "Schaum's Outline of Engineering Mechanics Dynamics," The McGraw-Hill Companies, Inc., 2011.
- Anon, "The Mechanics Problem Solver," Research & Education Association; Revised edition, Piscataway, New Jersey, March 5, 1980.
- McMahon, D., "Statics and Dynamics DeMYSTiFeD," The McGraw-Hill Companies, Inc., 2007.
- Pletta, D.H., and Frederick, D., "Engineering Mechanics: Statics and Dynamics," The Roland Press Co., New York, 1964. (Text uses index notation to solve mechanics problems.)

Descriptions of major assignments and examinations

Exams

- Homework, quizzes, and 3-50 minute exams including the final exam. (December 12, 2017, 5:30 PM – 8:00 PM)

Quizzes – Reading Assignment

- 10-minute quizzes will be given (generally one per week…on any TT) over material and assignments.

Homework

- Homework will be assigned throughout the semester.
- Homework must follow the format as provided on Blackboard and must be readable. When evaluated, failure to follow this format will result in a "zero" grade for that assignment.
- Homework assignments shall be presented on engineering paper using the front-side of the paper only.
- Homework assignments in one week are due on Tuesday of the following week at the beginning of class.
  Unless directed by the instructor, all assignments will be uploaded using PDF format to Blackboard for review.

Attendance: At The University of Texas at Arlington, taking attendance is not required but attendance is a critical indicator in student success. Each faculty member is free to develop his or her own methods of evaluating students' academic performance, which includes establishing course-specific policies on attendance. However, while UT Arlington does not require instructors to take attendance in their courses, the U.S. Department of Education requires that the University have a mechanism in place to mark when Federal Student Aid recipients "begin attendance in a course." UT Arlington instructors will report when students begin attendance in a course as part of the final grading process. Specifically, when a student is assigned a grade of F, faculty report the last date a student attended their class based on evidence such as a test, participation in a class project or presentation, or an engagement online via Blackboard, the date is reported to the Department of Education for federal financial aid recipients.

Students taking this course are expected to attend every class, to arrive on time, and to stay in class until they are dismissed. Students who fail to adhere to the attendance policy can expect an impact on their grade. Attendance will be considered in the assignment of the final letter grade. Students will not be penalized in the case of an emergency, or an incident beyond the student's control.

Grading

- Final Grade Weighting:

Homework:	5%
Quizzes	20%
Mid Term Exam	25%
Trimester Exam	25%
Final Examination	25%

- Grade Allocation: Letter grades will be assigned by the following ranges
  A (85-100), B (75-84), C (65-74), D (55-64), F (less than 55)

To receive a passing grade ("C" for an Engineering major), the weighted average (see above) of the homework, 3-exams, and the final examination must be 65 or above.

As grades are assessed, they will be posted on Blackboard for the students to review. Students are expected to keep track of their performance throughout the semester and seek guidance from available sources (including the instructor) if their performance drops below satisfactory levels.

- **Homework Grading Policy:** Only one (1) homework problem, randomly chosen, from each week's assignment will be graded. The grade for that problem will be assigned for that week's effort and scaled by ratio of the number of problems completed to the number of required problems.

Exam & Quiz Policy

Quizzes

- **All quizzes are "closed-book, closed notes".**
- There will be **NO** make-up quizzes. **Missed quizzes will receive a grade of zero**. One quiz grade will be dropped when determining the final grade.

Exams

- All problems stated in the exams will be weighted equally unless otherwise specified.
- **All exams are "closed-book, 1 page (8.5"x11") – one-side only – of notes".** No internet capable devices (i.e. laptops, tablet devices or calculators) can be used during exams. Only simple, hand calculators are permitted during class exams. (see **Use of Electronic Devices** section of the syllabus)
- Students will be allowed a single-sided, 8.5x11 piece of paper (i.e. no writing on the back of the paper) with their personal exam notes, formulas, etc. Failure to follow these instructions will result in confiscation of the formula sheet. The formula sheet will be turned in with its corresponding exam as part of the exam. **Failure to turn in the formula sheet will result in a grade of zero for the exam.**
- There will be **NO** make-up exams for unexcused absences. **Missed exams will receive a grade of zero**.
- A student having an **UNEXCUSED** absence from the final exam will receive the course grade earned.
- A student having an **EXCUSED** absence from the final exam has two options:
  - The student may elect to receive the course grade earned with the final exam grade equal to zero, or
  - The student may elect to receive the grade of "I" (incomplete) and make arrangements to complete the course by taking the final examination at the end of the next semester.
  - If the student chooses the second option, it is the student's responsibility to consult with the instructor regarding completion of the course requirements.

- NOTE: Excuses for absences from the final exam must be in writing with appropriate verification; e.g., note from your doctor, dentist, etc.

Special Needs

The instructor must be notified at the beginning of the semester, **within the first week of class**, by any student requiring **'Special Needs'** exam testing. The student must be registered and approved for special testing allowances. If so, the student is responsible for obtaining and presenting the necessary confirmation forms to the instructor in that first week. Additionally, **the student is responsible for coordinating all "special needs testing" with the test center two weeks before each exam**. **This includes coordinating with the instructor the date and time of the alternate test.** Per the university procedures, the testing center will contact the instructor and arrange the necessary private test schedule after the student has coordinated with the test center and the instructor. **Failure to meet these requirements will negate any "special needs testing" for that exam.**

Course Schedule: A course schedule will be provided in Blackboard. Exam dates and reading assignments are provided on the schedule. Homework assignments and project assignments will be updated on a continuous basis. Homework assignments shall be uploaded to Blackboard unless directed by the instructor.

Use of Electronic Devices

- Cellphone use in class is prohibited. Use in class is prohibited.
- No internet capable devices (i.e. laptops, tablet devices or calculators) can be used during exams.
- Only simple, hand calculators are permitted during class exams.
- Laptops, tablet devices, etc. may be used during lectures for taking personal notes ***with permission of the instructor.***
- **No audio and/or video recordings by the students are permitted.**

Expectations for Out-of-Class Study: Beyond the time required to attend each class meeting, students enrolled MAE 1312, a 3-credit hour course, should expect to spend at least an additional 9 hours per week of their own time in course-related activities, including reading required materials, completing assignments, preparing for exams, etc. (The general rule of thumb is for every credit hour earned, a student should expect to spend at minimum 3 hours per week working outside of class.)

Grade Grievances: Any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current undergraduate catalog. For undergraduate courses, see http://catalog.uta.edu/academicregulations/grades/#undergraduatetext; for graduate courses, see http://catalog.uta.edu/academicregulations/grades/#graduatetext. For student complaints, see http://www.uta.edu/deanofstudents/student-complaints/index.php

Drop Policy: Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance**. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (http://wweb.uta.edu/ses/fao).

Disability Accommodations: UT Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including *The Americans with Disabilities Act (ADA), The Americans with Disabilities Amendments Act (ADAAA),* and *Section 504 of the Rehabilitation Act.* All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of disability. Students are responsible for providing the instructor with official notification in the form of **a letter certified** by the Office for Students with Disabilities (OSD). Only those students who have officially documented a need for an accommodation will have their request honored. Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting:
The Office for Students with Disabilities, (OSD) www.uta.edu/disability or calling 817-272-3364. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability.

Counseling and Psychological Services, (CAPS) www.uta.edu/caps/ or calling 817-272-3671 is also available to all students to help increase their understanding of personal issues, address mental and behavioral health problems and make positive changes in their lives.

Title IX Policy: The University of Texas at Arlington ("University") is committed to maintaining a learning and working environment that is free from discrimination based on sex in accordance with Title IX of the Higher Education Amendments of 1972 (Title IX), which prohibits discrimination on the basis of sex in educational programs or activities; Title VII of the Civil Rights Act of 1964 (Title VII), which prohibits sex discrimination in employment; and the Campus Sexual Violence Elimination Act (SaVE Act). Sexual misconduct is a form of sex discrimination and will not be tolerated. *For information regarding Title IX, visit* www.uta.edu/titleIX or contact Ms. Jean Hood, Vice President and Title IX Coordinator at (817) 272-7091 or jmhood@uta.edu.

Academic Integrity: Students enrolled all UT Arlington courses are expected to adhere to the UT Arlington Honor Code:

> "I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.
> I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code."

UT Arlington faculty members may employ the Honor Code as they see fit in their courses, including (but not limited to) having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System Regents' Rule 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University.

Lab Safety Training: No lab training is required for this course.

Electronic Communication: UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account,

which remains active even after graduation. Information about activating and using MavMail is available at http://www.uta.edu/oit/cs/email/mavmail.php.

Campus Carry: Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. Under the new law, openly carrying handguns is not allowed on college campuses. For more information, visit http://www.uta.edu/news/info/campus-carry/

Student Feedback Survey: At the end of each term, students enrolled in classes categorized as "lecture," "seminar," or "laboratory" shall be directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student's feedback enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit http://www.uta.edu/sfs.

Final Review Week: for semester-long courses**,** a period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

Student Support Services: UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at http://www.uta.edu/universitycollege/resources/index.php.

The IDEAS Center (2nd Floor of Central Library) offers free tutoring to all students with a focus on transfer students, sophomores, veterans and others undergoing a transition to UT Arlington. To schedule an appointment with a peer tutor or mentor email IDEAS@uta.edu or call (817) 272-6593.

The English Writing Center (411LIBR): The Writing Center Offers free tutoring in 20-, 40-, or 60-minute face-to-face and online sessions to all UTA students on any phase of their UTA coursework. Our hours are 9 am to 8 pm Mon.-Thurs., 9 am-3 pm Fri. and Noon-6 pm Sat. and Sun. Register and make appointments online at http://uta.mywconline.com. Classroom Visits, workshops, and specialized services for graduate students are also available. Please see www.uta.edu/owl for detailed information on all our programs and services.

The Library's 2nd floor Academic Plaza offers students a central hub of support services, including IDEAS Center, University Advising Services, Transfer UTA and various college/school advising hours. Services are available during the library's hours of operation. http://library.uta.edu/academic-plaza

Library Home Page library.uta.edu

Resources for Students

Academic Help

- Academic Plaza Consultation Services library.uta.edu/academic-plaza
- Ask Us ask.uta.edu/
- Library Tutorials library.uta.edu/how-to
- Subject and Course Research Guides libguides.uta.edu
- Subject Librarians library.uta.edu/subject-librarians

Resources

- A to Z List of Library Databases libguides.uta.edu/az.php
- Course Reserves pulse.uta.edu/vwebv/enterCourseReserve.do
- FabLab fablab.uta.edu/
- Special Collections library.uta.edu/special-collections
- Study Room Reservations openroom.uta.edu/

Teaching & Learning Services for Faculty

- Copyright Consultation library-sc@listserv.uta.edu
- Course Research Guide Development, Andy Herzog amherzog@uta.edu or your subject librarian
- Data Visualization Instruction, Peace Ossom-Williamson peace@uta.edu
- Digital Humanities Instruction, Rafia Mirza rafia@uta.edu
- Graduate Student Research Skills Instruction, Andy Herzog amherzog@uta.edu or your subject librarian
- Project or Problem-Based Instruction, Gretchen Trkay gtrkay@uta.edu
- Undergraduate Research Skills Instruction, Gretchen Trkay gtrkay@uta.edu or your subject librarian.

"As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course. – Baxter R. Mullins, Jr."

MAE 1312-003 – Engineering Statics
Fall Semester 2017
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Engineering Static

MAE 1312-003
3 HOURS CREDIT

FALL 2017

SYLLABUS

By signing this syllabus, the student acknowledges that he/she has read and understood this document.

Print Name: _____

Signature: _____ Date: _____

Prepared by: Baxter R. Mullins, Jr.
Date: 24 August 2017