



## ET450 Statics and Strength of Materials, 4 Credits

**COVID19:** Due to the COVID19 Pandemic and current federal, state, CDC, and UNH rules and regulations, course formats may change at any time during the semester. It is important to read and look for UNH COVID19 Updates as well as check your UNH student email account and the Canvas course sites.

**Course Format:** This course is an in-person, on-campus course. There is no remote attendance option. There are regularly scheduled meeting times once a week for lecture and lab and students are expected to attend. See course outline for topics/schedule and projected assignment due dates. Student participation is expected. All due dates apply to all students and will be strictly enforced.

**COURSE DESCRIPTION:** The statics portion of the course analyzes equilibrium force systems applied to rigid bodies and the internal stresses and strains which result. The strength of materials portion of the course investigates the relationship between internal stress and strain to material properties and behavior. Topics include: free body diagrams, equilibrium force analysis, tension, compression, shear and moment diagrams, torsion, bending, trusses, and beam deflection analysis.

Pre-requisites: MATH418, Pre- or co-requisite: PHYS407

### CLASS MEETING INFO:

Section	Day	Start Time	End Time	Room
Lecture In-person	Friday	8:01 AM	10:50 AM	P102
Lab In-person	Friday	11:01 AM	12:50 PM	P102 (P116 as Needed)

### REQUIRED TEXT:

Applied Statics and Strength of Materials, 6<sup>th</sup> edition, Limbrunner, D'Allaird, & Spiegel, Pearson 2016, ISBN13- 978-0133840544 hard text version  
etext version: ISBN-13: 9780133840773

**INSTRUCTOR:** Dennis Tappin

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**Email Response Time:** *At a minimum, the instructor will check email each day/night and respond accordingly, typically within 24 hours, please be patient with email responses.*

**Other contact methods:** *It is acceptable to SMS the instructor at the given phone number. If using this method of communication, students should identify themselves accordingly.*



**OFFICE HOURS:** Office is virtual – via Zoom by appointment

**GRADING:** The grading for this course will be divided among the following categories:

Chapter Assessments	25%
Exams (5)	35%
Lab assignments	25%
Final Exam (comprehensive)	15%
	100%

Spreading the overall course grade across different assessment methods is helpful for most students who may have a difficulty with one method, e.g. test anxiety, time constraint, etc. It is important that the student complete assignments in each of the above categories in order to achieve a passing grade in this course.

If you have questions during the semester, please feel free to ask the instructor. If you are having trouble understanding the material or with the course, please let the instructor know as early as possible.

**ASSIGNMENTS:** All assignment information will be posted on Canvas with applicable due dates. All assignments must be submitted by the due date. Assignments will close “ONE-WEEK” beyond the announced due date. Late assignments will be reduced one full letter grade. Late assignments submitted after the “ONE-WEEK” period will not be accepted and a grade of “zero” will be recorded for that assignment.

Chapter related assignments will be given each week. These will be submitted via Canvas. It is advised that students work through all problems as recommended. Test problems will be very similar in nature and the homework will offer practice.

Exams: Each test will cover general topics related to the lecture and lab sessions for the posted chapters. In general, the format of the test will be problem oriented similar to class and chapter assessment problems.

**ASSIGNMENT SUBMISSION REQUIREMENTS:** General requirements for assignments, as well as tests, and final project:

1. Always show all your work. (No partial credit can be given unless steps are clearly shown.)
2. Clearly identify final answers.
3. Work should be legible and performed in a clear organized manner.
4. Turn in homework in electronic form. Electronic form should consist of a single coherent legible document for each single assignment. Do not submit several pieces of electronic items such as phone snapshots for a given single assignment. Scanning may be done using the ET Commons copier/printer.
5. Include a cover page with assignment information on each assignment submitted. This includes the assignment number and type of assignment, e.g. Homework #1 Chapter 1. Be sure to include your name on cover page.



6. Some assignment formats may vary per activity/exercise.
7. Refer to the posted workmanship document for additional guidance for all submissions.

These items facilitate fair grading of the assignment and granting of partial credit where warranted. Working on assignments in groups is permitted but each person will submit individual assignments when required. Activity assignments may be individual or by group depending on the exercise and requested format.

**ATTENDANCE:** The University absent policy is found in the handbook at this website address: <https://www.unh.edu/student-life/student-rights-rules-responsibilities> Students are responsible for all material covered in class and posted on Canvas. Regular class attendance and participation in discussions is strongly encouraged and expected.

**POLICY ON EXAMS:** If a student needs to miss an exam for any reason, the instructor should be notified prior to the session in which it is given. In extreme circumstances and if no prior notification is possible, the student must contact the instructor within 24 hours of the missed test and submit a valid reason why the test was missed. **It is the student's responsibility to make arrangements upon immediate return from said absence.** A modified test may be given on a case by case basis. See the Student with Disabilities section if modified exams are required.

**ACADEMIC HONESTY:** In the preparation and presentation of any assigned work – including examinations, tests, quizzes, term papers, reports, papers and other written or oral exercises – every student shall conform to a strict standard of academic honesty. Any attempt to deceive a faculty member or to help another student to do so will be considered a violation of this standard. In all assignments, students must acknowledge the words and/or ideas of others taken from print or electronic media, whether a direct quotation or a paraphrase; any omission of this is dishonest. Cheating on examinations or tests consists of knowingly giving, receiving, or using – or attempting to give, receive, or use – unauthorized assistance during an examination or test. A faculty member may record a grade of “zero” for any assignment on which a student has plagiarized or cheated. For repeat offenses within a single course, the faculty member may record a grade of “F” for the course. Violations of this policy in multiple courses may result in dismissal from the college. See [University Academic Honesty Policy](#) and [Tutorial on Plagiarism](#).

**PROFESSIONALISM:** Honesty is expected of all students. Students are expected to complete their own work at all times. When working in an instructor approved group, in specified lab exercises, group members may work together to assist one another when appropriate, but each student is expected to submit their own original work. Plagiarism or cheating is a serious offense and will be treated according to the guidelines outlined in the NHTI Student Handbook.

Students are expected to show proper behavior and respect in the classroom and laboratory. Each student is expected to act as a professional as would be expected in industry. This includes the use of proper language and attitude toward the instructor and other students. Students should be on-time, not exit and re-enter class or lab excessively,



and not leave early. Cell phones **should be turned off and put away** during lecture and laboratory sessions. Courtesy and respect is expected from all students. **All safety practices and policies must be adhered to at all times, especially in the lab.** Improper behavior or continued violations of any of the above rules will not be tolerated. Violation of the above rules, especially safety rules, will result in suspension from the lab and/or course with appropriate corresponding grade consequences.

**POLICY ON MAKEUP LABS:** Lab Project Makeup is very difficult except for situations and circumstances where well documented excused absences have occurred. It is important to attend all scheduled lab sessions. Be on time for the lab and do not leave early. Failure to attend various labs can result in projects not being fully completed. This will have resulting grade consequences.

### **COURSE SPECIFIC OBJECTIVES OR OUTCOMES:**

1. Given the applied forces and moments acting on a structure or member of a structure, the student will be able to determine the reaction forces and/or moments at the supports.
2. Given all the external forces and moments acting on a structure or member of a structure, the student will be able to determine the internal forces and/or moments acting inside each member.
3. Given the internal forces acting within a member, the student will be able to determine the stresses present by applying the proper equations for tension, compression, shear, torsion, and bending stresses depending upon the type of loading present.
4. Through various material testing methods in the laboratory experiments, the student will be able to determine several mechanical properties of different types of materials and how they behave under various loading situations.
5. The student can conduct a failure analysis by comparing the internal stresses in a member with the material properties using a factor of safety approach. Prevention of structural failure can then be determined.
6. The student will be able to predict the deformation of a member under various types of applied loading situations such as tension, compression, shear, torsion, and bending.
7. Utilizing stress, deformation, and factor of safety equations, along with the material properties, the student will be able to size appropriate members for a given applied loading situation.

**STUDENTS WITH DISABILITIES:** According to the Americans with Disabilities Act (as amended, 2008), each student with a disability has the right to request services from UNH



to accommodate his/her disability. If you are a student with a documented disability or believe you may have a disability that requires accommodations, please contact Janessa Zurek, Student Accessibility Coordinator, in the Student Services Suite at 603.641.4383 or [janessa.zurek@unh.edu](mailto:janessa.zurek@unh.edu). Accommodation letters are created by our Coordinator with the student. Please follow-up with your instructor as soon as possible to ensure timely implementation of the identified accommodations in the letter. Faculty have an obligation to respond once they receive official notice of identified accommodations. Faculty have no obligation to provide retroactive accommodations.

**UNH STATEMENT ON EMOTIONAL OR MENTAL HEALTH DISTRESS:** In partnership with The Mental Health Center of Greater Manchester, UNH Manchester offers consultation visits in the Academic Advising department (located in the Student Services suites, 4th floor).

Services include:

- Free confidential screening & consultation with a licensed mental health therapist.
- Referrals to mental health or substance misuse treatment.
- And assistance in understanding how to afford additional treatment (with or without insurance!) or find free services.

If you would like to connect to counseling services directly, you may do so by contacting The Greater Manchester Mental Health Center at (603) 668 - 4111. If you or someone you know is experiencing a mental health or substance misuse crisis, please contact the Mobile Crisis Response Team (MCRT) at (800) 688 - 3544.

The National Suicide Prevention Lifeline provides 24/7, free and confidential support via phone or chat for people in distress, resources for you or your loved ones, and best practices for professionals. Call (800) 273-TALK (8255).

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The following section gives information about the program accreditation criteria and required program assessment. Excerpts are taken from the ABET/ETAC Accreditation Manual.

### **ABET/ETAC (Accreditation Board for Engineering and Technology/Engineering Technology Accreditation Commission)**

#### **I. General Criteria (2019)**

##### **Criterion 3. Student Outcomes**

The program must have documented student outcomes with a documented and effective process for the periodic review and revision of these student outcomes. For purposes of this section, well-defined activities or problems are practical, narrow in scope, use conventional processes and materials in traditional ways, and require knowledge of





standard operating processes. Broadly-defined activities or problems are practical, broad in scope, relatively complex, and involve a variety of resources; use new processes, materials, or techniques in innovative ways; and may require extension of standard operating procedures.

**B. For baccalaureate degree programs, these student outcomes must include, but are not limited to, the following:**

- (1) an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline;
- (2) an ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline;
- (3) an ability to apply written, oral, and graphical communication in broadly-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature;
- (4) an ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes; and
- (5) an ability to function effectively as a member as well as a leader on technical teams.

## **II. PROGRAM CRITERIA**

### **MECHANICAL ENGINEERING TECHNOLOGY**

#### **PROGRAM CRITERIA FOR BACCALAUREATE LEVEL PROGRAMS**

The curriculum must prepare baccalaureate degree graduates with the knowledge, techniques, skills, and use of modern equipment in mechanical engineering technology. Baccalaureate degree graduates build on the strengths of associate degree programs by gaining proficiency in the analysis, applied design, development, implementation or oversight of more advanced mechanical components, systems or processes. Programs may focus on preparing graduates with in-depth but narrow expertise, while other programs may choose to prepare graduates with a broad spectrum of expertise. The depth and breadth of expertise demonstrated by baccalaureate graduates must support the program educational objectives. The following curricular topics are required (unless the program's faculty and primary constituents approve the substitution of other specific, mechanically-related technical subjects supporting attainment of program educational objectives):

- a. Application of principles of geometric dimensioning and tolerancing;
- b. Use of computer aided drafting and design software;
- c. Perform selection, set-up, and calibration of measurement tools/instrumentation;



- d. Elements of differential and integral calculus;
- e. Manufacturing processes;
- f. Material science and selection;
- g. Solid mechanics (such as statics, dynamics, strength of materials, etc.);
- h. Mechanical system design;
- i. Thermal sciences (such as thermodynamics, fluid mechanics, heat transfer, etc.);
- j. Electrical circuits (ac and dc) and electronic controls;
- k. Application of industry codes, specifications and standards; and
- l. Technical communications typically used in preparation of engineering proposals, reports, and specifications.

**ET450: MECHANICAL ENGINEERING TECHNOLOGY PROGRAM OUTCOMES**

This course covers general topics which lead directly to achieve the ABET MET Program Specific Curriculum requirements in Categories “f” (material science and selection), “g” (solid mechanics – statics and strength of materials), and “l” (technical communications – lab reports). These outcomes are assessment tools in the General Criteria 4 Continuous Improvement Plan.

Can also be used for Assessment of Student Outcomes (1) and/or (4).