



**OVERALL COURSE CONTENT:** Kinematics, kinetics, work and energy, fluids, heat transfer; application of these concepts to problems in mechanical design.

**PREQUISITE:** Statics and Strength of Materials

**CLASS MEETING INFO:**

Section	Day	Start Time	End Time	Room
Lecture	Thursday	6:00PM	9:00PM	88 Commercial St, Rm. P142

**REQUIRED TEXTS:**

- *Analysis of Machine Elements Using SOLIDWORKS Simulation 2017*, By Shahin S. Nudehi Ph.D., P.E., John R. Steffen Ph.D., P.E., ISBN: 978-1-63057-075-0

**OPTIONAL TEXTS:**

- *Engineering Mechanics: Statics & Dynamics*, 5th Edition, Bedford & Fowler, Publisher: Pearson, ISBN-13: 9780136142256
- *Machine Design, An Integrated Approach*, 5<sup>th</sup> Edition, Robert L. Norton, Pearson/Prentice-Hall, 2014: ISBN-10: 013335671X; ISBN-13: 9780133356717.

**INSTRUCTOR:** Prof. Jeff Beltramo  
e-mail: [jbeltramo@ccsnh.edu](mailto:jbeltramo@ccsnh.edu)  
Office: 603-271-6484, x4111 (NHTI)

**OFFICE HOURS:** By Arrangement. Please contact by e-mail (preferred) or phone. Students are encouraged to seek help from the instructor before falling too far behind.

**CLASS FORMAT:** Classes will consist of lectures by instructor with supporting activities for the student using MathCAD and SolidWorks in the computer lab.

**ONLINE RESOURCE:** <https://mycourses.unh.edu/>

**GRADING POLICIES:** Breakdown will be as follows:

Attendance/Participation	5%
Homework	20%
Tests (2)	30%
Project	20%
Final Exam	25%

**ASSIGNMENTS:** For homework assignments, tests, and final exam:

- (1) Show your work. (No partial credit can be given unless steps are clearly shown.)
- (2) Clearly identify your final answer.
- (3) Write legibly, define variables clearly, and use sketches where appropriate.
- (4) Turn in each assignment in the form of a single coherent hard copy.



These items facilitate fair grading of the assignment and granting of partial credit where warranted. Working on homework and lab assignments in groups is permitted and encouraged but each student is expected to turn in their own work.

Homework will be assigned each week and due the following class period unless specified otherwise. Homework will be collected electronically via the course Canvas site. Details for uploads will be provided in class.

**Homework solutions will be provided via course Canvas site on the due date and will remain available for a minimum of one week. Homework turned in after solutions are posted will be accepted but at a substantial grade penalty.**

**ATTENDANCE:** The University level absentee policy can be found in the handbook here:

<https://www.unh.edu/student-life/handbook/academic/attendance-class-requirements>

In short, you are expected to be in class each week. More than 4 unexcused absences in a semester may be cause for referral to college dean. If you will be absent, communication is key. An email or voicemail informing me of the absence is much appreciated.

**LECTURES:** Students are responsible for all material covered in class. Regular class attendance and participation in discussions is a necessary part of completion of the course.

**TESTS AND PROJECT:** Two tests will be given during term. If a student needs to miss a test for any reason, the instructor must be notified prior to the session in which it is given. If a test is missed without prior notification the student will receive a grade of zero. In extreme circumstances and if no prior notification is possible, the student must contact the instructor within 24 hours of the missed test or exam and submit in writing why the scheduled test period was missed. A modified exam may be given on a case by case basis. See the Disabled Student section if modified exams are required.

A project will be required for the class. The project will require extensive use of skills learned in the class and demonstrated through the report. The report will be submitted in stages with a final report due near the end of the term. Details of the project will be provided in class.

**ACADEMIC HONESTY:** In the preparation and presentation of any assigned work – including examinations, tests, quizzes, term papers, reports, themes 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.



Complete Academic Honesty policy can be found here <https://www.unh.edu/student-life/09-academic-honesty>

**STUDENTS WITH DISABILITIES:** The University of New Hampshire at Manchester is committed to providing students with disabilities with a learning experience which assures them of equal access to all programs and facilities of the University, which makes all reasonable academic aids and adjustments for their disabilities and provides them with maximum independence and the full range of participation in all areas of life at UNH Manchester.

Any student who feels s/he may need an accommodation based on the impact of a disability should contact UNHM Disability Services Coordinator to discuss you specific needs. Please contact Jenessa Zurek at [Jenessa.Zurek@unh.edu](mailto:Jenessa.Zurek@unh.edu) to coordinate reasonable accommodations for students with documented disabilities. Additional information can be found at <https://manchester.unh.edu/student-accessibility-services>

## ABET STUDENT OUTCOMES

### ABET Outcomes/Course Objectives Matrix

	Outcome 1	Outcome 2	Outcome 3	Outcome 4	Outcome 5
<b>Course Objectives</b>					
Apply principles of static equilibrium to analyze three dimensional problems	3	2			
Use static and fatigue failure theories to design mechanical components	3	3			
Compute factor of safety for various loads and geometries	3	2			
Calculate deflection and deformations of components within elastic limits	3	2			
Solve complex loading and geometry problems using Finite Element Analysis	3	3			1
Analyze factor of safety of complex mechanical systems using multiple failure theories	3		3		

1 = objective addresses the outcome slightly, 2 = moderately, 3 = substantively

- Outcome 1: an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems to Mechanical Engineering Technology
- Outcome 2: an ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to Mechanical Engineering Technology
- Outcome 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.
- Outcome 4: an ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes.
- Outcome 5: an ability to function effectively as a member as well as a leader on technical teams.



**CORE COURSE TOPICS:**

- Review Vectors and 3D Statics
- Multibody Statics
- Test #1
- Introduction to Finite Element Analysis (FEA)
- Multi-axial Stress
- Static Failure Theories
- Test #2
- Axial and Beam Deflections
- Kinematics/Dynamics
- Dynamic Simulations
- Final Exam

Supplemental material will be supplied as required