COURSE	Advanced Machine Design
COURSE NUMBER	ENGR 496**/**MCEN 4228
CREDITS	3 credits
INSTRUCTOR	Nathan McNeill, Ph.D., P.E. AEC 206 nmcneill@colorado.edu nmcneill@coloradomesa.edu (970) 248-1623
OFFICE HOURS	M W 9:00 AM – 12:00 PM, 3:00 PM – 5:00 PM T Th 1:00 PM – 5:00 PM
MEETING TIMES	M W 1:00 – 2:15 PM
MEETING LOCATION	AEC B West
PREREQUISITES	ENGR 325 or MCEN 3025 Component Design
TEXTBOOKS	Shigley's Mechanical Engineering Design (10th Edition) by Richard Budynas & Keith Nisbett ISBN: 978-0073398204
WEBSITES	**CMU** https://d2l.coloradomesa.edu **CU** https://learn.colorado.edu

GRADING

Assignments	60 %
Exams	30 %
Quizzes	10 %

Letter grades will be assigned as follows:

	CMU	**CU**
A	90.00 – 100 %	93.33 – 100 %
A-		90.00 – 93.32 %
B+		86.67 – 89.99 %
B	80.00 – 89.99 %	83.33 – 86.66 %
B-		80.00 – 83.32 %
C+		76.67 – 79.99 %
C	70.00 – 79.99 %	73.33 – 76.66 %
C-		70.00 – 73.32 %
D+		66.67 – 69.99 %
D	60.00 – 69.99 %	63.33 – 66.66 %
D-		60.00 – 63.32 %
F	< 60.00 %	< 60.00 %

COURSE DESCRIPTION

The course builds on the content of the pre-requisite course in machine component design. The focus of this course is on the design of complete machines and the resulting interactions between individual components that make up a complete machine.

This course requires significant reading of the textbook as well as supplemental material that will be posted to the course website. Readings will be assigned during class meetings. Quizzes will occur as noted on the course schedule, but may occur more often than indicated. A considerable amount of class time will be devoted to problem solving exercises that are due on the dates indicated on the calendar below. Assignments are due at the beginning of class on the dates indicated and late assignments will generally not be accepted. You can expect to spend up to three hours working outside of class for every hour that you spend in class. Many assignments will require the use of supplemental reference materials that can be found on the course website.

There will be three exams in this course. Each exam (including the final) will be worth 10% of the course grade. Organization and neatness will account for a significant portion of each assignment and exam grade.

LEARNING OBJECTIVES

Upon completion of this course you should be able to apply the following topics to the design of machines:

1. Static failure theories
2. Fatigue failure theories
3. Rolling bearing selection and life prediction
4. Theories of column failure
5. Industry codes

SCHEDULE

Date	Topic	Machine	Due
Week 1			
Aug 21	Stress vs. strength & deflection	Conveyor	Quiz
Aug 23	Design guidelines	Conveyor	
Week 2			
Aug 28	Design guidelines	Conveyor	
Aug 30	Fatigue & shaft design	Conveyor	Assignment 1
Week 3			
Sep 4	Bearings		
Sep 6	Combined stresses & failure theories	Conveyor	Assignment 2
Week 4			
Sep 11	Machine structures	Conveyor	
Sep 13	Weldments	Conveyor	Quiz
Week 5			
Sep 18	Columns	Conveyor	Assignment 3
Sep 20	Shear failure & bolted connections	Conveyor	
Week 6			
Sep 25	Exam review	Conveyor	Assignment 4
Sep 27	Exams		Exam 1
Week 7			
Oct 2	Design codes	Elevator	
Oct 4	Machine structures	Elevator	Quiz
Week 8			
Oct 9	Machine structures	Elevator	
Oct 11	Gear selection	Elevator	Assignment 5
Week 9			
Oct 16	Lubrication	Elevator	
Oct 18	Shaft design	Elevator	Assignment 6
Week 10			
Oct 23	Bearings	Elevator	
Oct 25	Machine structures	Elevator	Assignment 7
Week 11			
Oct 30	Brakes	Elevator	
Nov 1	Machine structures	Elevator	

Date	Topic	Machine	Due
Week 12			
Nov 6	Exam review	Elevator	Assignment 8
Nov 8	Exams		Exam 2
Week 13			
Nov 13	Kinematics	Steam engine	
Nov 15	Thermal design	Steam engine	Quiz
Week 14			
Nov 20	Thanksgiving Break		
Nov 22	Thanksgiving Break		
Week 15			
Nov 27	Fatigue design	Steam engine	
Nov 29	Journal bearings	Steam engine	Assignment 9
Week 16			
Dec 4		Steam engine	
Dec 6	Exam review		Assignment 10
Finals Week			
Dec 11– 14	Final exam (date and time to be determined)		

Classroom Behavior

Compliance with the expectations described in this document will assist with the creation of a learning community and a high quality educational experience. Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender, gender variance, and nationalities. Class rosters are provided to the instructor with each student's legal name. If you wish to be addressed you by an alternate name or gender pronoun please advise the instructor of this preference early in the semester.

Academic Integrity (CMU)

The faculty, administration, and students of Colorado Mesa University support the principle that all individuals associated with the academic community have a responsibility for establishing, maintaining, and fostering an understanding and appreciation for academic integrity. A value fundamental to the principle of independent learning is the requirement of honesty and integrity in the performance of academic assignments, both inside and outside the classroom. By submitting work which is not your own, you may forfeit the opportunity to continue as a student. Each student accepts the responsibility of maintaining honor in all aspects of academic study and the support of this principle as it applies to others. For more information about Colorado Mesa University policies see:

http://www.coloradomesa.edu/academic-affairs/policies.html

Academic Integrity (CU)

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the academic integrity policy of the institution. Violations of the policy may include: plagiarism, cheating, fabrication, lying, bribery, threat, unauthorized access, clicker fraud, resubmission, and aiding academic dishonesty. Credit must be clearly given for code or designs legally borrowed from others. Submission of project work performed previously or concurrently for a different course constitutes cheating, if instructor consent is not obtained prior to submission. When in doubt, ask the instructor for clarification. All incidents of academic misconduct will be reported to the Honor Code Council (honor@colorado.edu; 303-735-2273). Students who are found responsible of violating the academic integrity policy will be subject to nonacademic sanctions from the Honor Code Council as well as academic sanctions from the faculty member. Additional information regarding the academic integrity policy can be found at:

http://honorcode.colorado.edu.

Student Services

The Office of Student Services works to support CMU students in all aspects of college life by offering a vast array of services, resources, and programs that make each student's time at Colorado Mesa University as exciting and successful as possible. Student Services works collaboratively with faculty, students, and staff to create a campus community that fosters the growth of students as strong individuals and productive citizens. To learn more, go to:

http://www.coloradomesa.edu/studentservices.

Disability Services

If you qualify for accommodations because of a disability, please submit to your instructor a letter from Educational Access Services (EAS) in a timely manner so that your needs can be addressed. For exam accommodations provide your letter at least one week prior to the exam. Disability Services determines accommodations based on documented disabilities and students must register with the EAS office to receive assistance. You may contact Barry Rochford, the Coordinator of Educational Access Services, directly by phone at 970-248-1826, or in person in Houston Hall, Suite 108.

Religious Observances

Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. Please contact your Instructor during the first two weeks of the semester to let her/him know of any possible conflicts to make the necessary arrangements.