NAU NORTHERN ARIZONA UNIVERSITY

Course Title: ME 365 Machine Design I
Term: Fall 2022
Instructor: TBA
Course Credit: 3
Mode of Instruction: Online

Course Description:

This course provides students with the fundamentals of mechanical design, including stress, deflection, material selection, strength, and design principles. It also contains the design of mechanical elements: screws, gears, shafts, and springs. Upon successful completion of the course, students will learn the fundamentals of the design process, and the design of some common machine elements.

Course Prerequisites:

CS 122 Programming For Engineering And Science

CENE 253 Mechanics Of Materials

Learning Outcomes:

By the end of the course, the student should be able to:

A. Master the concept of design and behavior of machine elements under varying load conditions;

B. Learn the concepts of failure theories, and apply them in machine design;

C. Design gear, bolts, shafts, bearings, riveted joints, etc., and demonstrate their performance based on proper applications;

D. Apply mechanical engineering design theory to identify and quantify machine elements in the design of commonly used mechanical systems.

Course Material:

Robert L. Norton, ***Machine Design: An Integrated Approach***, 4th Edition, Prentice Hall, 2010.

Evaluation:

- 2 Homework [20%]
- 2 Design Project [20%]
- Mid-term Exam [25%]
- Final Exam [35%]

Description of the Evaluation tasks:

Assignment/ Essay/ ... : During the term, students will be required to finish several evaluation tasks within due date. All the tasks are linked with specific course topics/outcomes and will adequately assess students' competence and learning outcomes. Students are encouraged to meet with instructor about these tasks at any point.

Mid-term/ Final Exams/ Quiz/... : There may be periodic quizzes given at the beginning of lecture sessions; the feedback from these quizzes will monitor the progress of the learners and help to set learning priorities. There will be mid-term exam/ final exam for the course. They are the basic criteria for the evaluation of students' learning outcomes and final grade.

Grading Policy:

Students are supposed to finish each online lecture. Prior to each class, students should finish the required readings. During the class time, students are encouraged to make use of all relevant online course resources and communicate with the instructor. Students' grades are accumulated based on the cumulative evaluations.

Students' letter grade will be assigned according to the following scale:

A+ 90-100	A 85-89	A- 80-84
B+ 77-79	B 73-76	B- 70-72
C+ 67-69	C 63-66	C- 60-62
D+ 57-59	D 53-56	D- 50-52
F < 50		

Academic Integrity:

Students must strictly adhere to the university's academic integrity rule; and all essays, exams and any other form of academic assignments must adhere to these rules. Any form of plagiarism, cheating, or misappropriation of materials will be considered a violation of academic integrity and will be punishable by the university.

Withdrawal from the Course(s):

Students will be able to apply for a transfer or withdrawal within 3 days of the starting date of the course. If a withdrawal is applied for within 3 working days, the tuition fee will be fully refunded. After 3 days, the tuition fee will not be refunded. If a withdrawal is applied for in the first two weeks, it will be recorded as W (Withdraw) on the course transcript. After this initial two-week period, the class will be recorded as F (Fail).

Tentative Schedule:

Week 1

1	Introduction to Design
2	A Design Process
3	Problem Formulation and Calculation
4	The Engineering Model

5	Computer Aided Design and Engineering **Homework#1**

Week 2

6	Material and Process
7	Material Property Definitions
8	The Statistical Nature of Material Properties
9	Homogeneity and Isotropy
10	Design Case Studies **Design Project#1**

Week 3

11	Load Determination
12	Loading Classes
13	**Midterm Test**
14	Free Body Diagrams
15	Load Analysis **Homework#2**

Week 4

16	Stress, Strain, and Deflection
17	Stress
18	Strain
19	Combined Stresses
20	Spring Rates **Design Project#2**

Week 5

21	Static Failure Theories
22	Failure of Ductile Materials Under Static Loading
23	Fracture Mechanics
24	Using the Static Loading Failure Theories
25	**Final Exam**