BUTTE COLLEGE
COURSE OUTLINE

I. **CATALOG DESCRIPTION**

ENGR 8 - Statics **3 Unit(s)**

Prerequisite(s): MATH 31, PHYS 41
Recommended Prep: NONE

Transfer Status: CSU/UC
34 hours Lecture
51 hours Lab

A first course in engineering mechanics: properties of forces, moments, couples and resultants; two- and three-dimensional force systems acting on engineering structures in equilibrium; analysis of trusses, and beams; distributed forces, shear and bending moment diagrams, center of gravity, centroids, friction, and area and mass moments of inertia. Optional additional topics include fluid statics, cables, Mohr's circle and virtual work. (C-ID ENGR 130).

II. **OBJECTIVES**

Upon successful completion of this course, the student will be able to:

A. Effectively formulate and communicate legible problem solutions to be understood by engineers in and out of their specific discipline.
B. Determine the forces that act on rigid bodies including external forces, weight, normal, distributed loads, friction and reactions at supports.
C. Calculate internal forces in members and create shear and bending moment diagrams for beams.
D. Perform vector analysis methods addressing forces acting on rigid bodies, trusses, frames, and machines.
E. Analyze two- and three-dimensional force systems on rigid bodies in static equilibrium.

III. **COURSE CONTENT**

A. **Unit Titles/Suggested Time Schedule**

Lecture

Topics	Hours
1. Vector Operations	1.00
2. Concurrent two- and three-dimensional force systems	3.00
3. Moments and couples	2.00
4. Equivalent force systems	2.00
5. Equilibrium of rigid bodies (two- and three-dimensional)	2.00
6. Center of mass; center of gravity	2.00
7. Centroids of areas and volumes	2.00
8. Distributed force systems	2.00
9. Trusses	2.00
10. Frames and machines	2.00
11. Beams; shear and bending moment diagrams	4.00
12. Principles of friction	2.00
13. Friction in machines	2.00
14. Area and mass moments of inertia	2.00
15. Cables	1.00

16. Mohr's circle	1.00
17. Virtual work	1.00
18. Fluid statics	1.00
Total Hours	34.00

Lab

Topics	Hours
1. Force Systems 2 dimensions	3.00
2. Force Systems 3 dimensions	6.00
3. Equilibrium, Mechanical System Isolation 2 dimenions	5.00
4. Equilibrium, Mechanical System Isolation 3 dimenions	6.00
5. Structures: Trusses	6.00
6. Beams and disctributed forces: external effects	4.00
7. Beams and disctributed forces: internal effects	6.00
8. Area Moment of Inertia	6.00
9. Friction	6.00
10. Virtual Work	3.00
Total Hours	51.00

IV. **METHODS OF INSTRUCTION**

A. Lecture
B. Instructor Demonstrations
C. Class Activities
D. Homework: Students are required to complete two hours of outside-of-class homework for each hour of lecture
E. Problem-Solving Sessions
F. Laboratory Experiments

V. **METHODS OF EVALUATION**

A. Exams/Tests
B. Homework
C. Group Participation
D. Lab Projects

VI. **EXAMPLES OF ASSIGNMENTS**

A. Reading Assignments
   1. Read the chapter on equilibrium in your text and be prepared to discuss in two dimensions along with their free body representations.
   2. Read the chapter in your text on the area of moments of inertia and be prepared to discuss in class how they are found and defined.

B. Writing Assignments
   1. Describe the internal effects on a beam under a given load and discuss the relationship between shear stress and bending moment in a 2-3 page paper.
   2. In a 2-3 page paper create a sketch of the breaking system of a regular car and analyze the force and moments involved.

C. Out-of-Class Assignments
   1. Solve equilibrium problems in 2- and 3-dimensions by using the method of the free body

diagram.
2. Create a diagram showing the shear stress and bending moment of a beam under a given load.

VII. **RECOMMENDED MATERIALS OF INSTRUCTION**

Textbooks:

A. Meriam J.L., Kraige L.G., Bolton J.N. Engineering Mechanics: Statics. 8th Edition. Wiley, 2014.
B. Hibbeler, R. Engineering Mechanics: Statics. 13th Edition. Pearson, 2012.

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