College of San Mateo
Official Course Outline

1. **COURSE ID:** ENGR 230 **TITLE:** Engineering Statics
   Units: 3.0 units **Hours/Semester:** 48.0-54.0 Lecture hours; and 96.0-108.0 Homework hours
   Method of Grading: Letter Grade Only
   Prerequisite: PHYS 250, and MATH 252

2. **COURSE DESIGNATION:**
   Degree Credit
   Transfer credit: CSU; UC

3. **COURSE DESCRIPTIONS:**
   Catalog Description:
   The study of systems in equilibrium. Plane and space force-moment systems, equivalent systems, free body diagrams; equilibrium problems involving structures, machines, distributed force systems, friction; shear and moment diagrams, moment of inertia, energy methods.

4. **STUDENT LEARNING OUTCOME(S) (SLO'S):**
   Upon successful completion of this course, a student will meet the following outcomes:
   1. Interpret written and pictorial problem descriptions as evidenced by correctly drawn free body diagrams and statement of assumptions.
   2. Determine whether solution of an equilibrium problem is feasible under rigid body assumptions.
   3. Set up and solve equilibrium equations for problems involving one or more rigid bodies under discrete loads.
   4. Set up and solve equilibrium equations for problems involving one or more rigid bodies under distributed loads.
   5. Evaluate results for reasonableness (in terms of units, magnitude, direction).
   6. Effectively communicate problem solutions to peers and experienced engineers.

5. **SPECIFIC INSTRUCTIONAL OBJECTIVES:**
   Upon successful completion of this course, a student will be able to:
   1. Interpret written and pictorial problem descriptions as evidenced by correctly drawn free body diagrams and statement of assumptions.
   2. Determine whether solution of an equilibrium problem is feasible under rigid body assumptions.
   3. Set up and solve equilibrium equations for problems involving one or more rigid bodies under discrete loads such as trusses, frames, and machines.
   4. Set up and solve equilibrium equations for problems involving one or more rigid bodies under distributed loads including those due to fluids. Determine internal shear force and bending moment in beams under various loading conditions.
   5. Evaluate results for reasonableness (in terms of units, magnitude, direction).
   6. Solve friction problems including multiple friction surfaces, belt friction, wedges.
   7. Begin to use energy methods (virtual work) to solve equilibrium problems.

6. **COURSE CONTENT:**
   Lecture Content:
   Basic Concepts (vectors, vector operations, units)
   Forces, moments (couples), and equivalent force systems
   Free Body Diagrams
   Mechanical Equilibrium (in two and three dimensions)
   Frames and Machines
   Trusses
   Centroids
   Distributed Loads
   Hydrostatics
   Beams (including shear and bending moment diagrams)
   Cables (optional)
   Friction (including belt friction and wedges)
   Moment of Inertia

Virtual Work
Case studies and additional applications (optional)

7. **REPRESENTATIVE METHODS OF INSTRUCTION:**
   Typical methods of instruction may include:
   A. Lecture
   B. Other (Specify): Lectures to introduce new material and topics. Textbook reading assignments to expand knowledge. Individual or group problem solving with rapid feedback from instructor to ensure understanding. Individual take-home problems to develop skills.

8. **REPRESENTATIVE ASSIGNMENTS**
   Representative assignments in this course may include, but are not limited to the following:
   Reading Assignments:
   Reading assignments (typically weekly) from the textbook.
   Other Outside Assignments:
   Problem sets that typically include 4 to 8 problems assigned from the textbook or developed by the instructor.

9. **REPRESENTATIVE METHODS OF EVALUATION**
   Representative methods of evaluation may include:
   A. Class Work
   B. Exams/Tests
   C. Homework
   D. Quizzes
   E. Individual problem-solving assignments. Group problem-solving assignments (optional). Individual problem-solving exams.

10. **REPRESENTATIVE TEXT(S):**
    Possible textbooks include:
    A. Beer, F. P., R.E. Johnston, D. Mazurek. *Vector Mechanics for Engineers - Statics*, 11th ed. New York: McGraw Hill, 2016
    B. J. L. Meriam and L. G. Kraige. *Engineering Mechanics - Statics*, Student Value ed. New York: John Wiley and Sons Inc., 2010

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