TAFT COLLEGE
West Kern Community College District

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Engineering (ENGR) 1520 Statics (3 Units) CSU:UC

Prerequisite: Successful completion of Physics (PHYS) 2221 General Physics (Calculus) and Mathematics (MATH) 2100 Analytic Geometry and Calculus I with a grade of 'C' or better

Prerequisite knowledge/skills: Before entering the course the student should be able to:

1. apply the laws and principles of classical mechanics and statics to the analysis and solution of problems of force, linear and rotational motion under the action of forces and torques, motion in a plane under gravitational force, elastic and inelastic collisions, static equilibrium, work and energy under conservative and non-conservative forces, periodic motion, fluids, wave motion and vibrating bodies,
2. apply the concepts and techniques of calculus learned in a concurrent or prior calculus course, or presented in the physics course, to problems requiring them,
3. analyze complex problems, each of which requires the identification of multiple applicable physical concepts and their use in an appropriate manner and sequence,
4. perform experiments in a reasonable manner, and prepare adequate experimental reports presenting the numerical results and analyzing the sources and significance of errors, and
5. list and discuss objectives of any experiment, the type of measurements made, why they were made, and how they entered into the determination of the desired result,
6. understand the use of functional notation,
7. plot and interpret graphs of functions,
8. differentiate algebraic, trigonometric, exponential, logarithmic and hyperbolic functions,
9. apply derivatives, and
10. find the integrals of basic functions, and
11. complete items 6-11 above by both hand computations and computer assisted (spreadsheet).

Advisory: Eligibility for English 1500 strongly recommended

Total Hours: 48 hours lecture

Catalog Description: A first course in engineering mechanics including 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, mass moments of inertia, fluid statics and cables.

Type of Class/Course: Transfer Degree Credit

Text: Hibbeler, Russell C. *Engineering Mechanics: Statics*. 14th ed. Upper Saddle River: Prentice Hall, 2016. Print.

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Course Objectives:

By the end of the course, a successful student will be able to:

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

Course Scope and Content (Lecture):

Unit I — Introduction to Statics
- A. Bodies at Rest
- B. Scalars and Vectors
- C. Forces: tension, compression, shear and torque

Unit II — Engineering Problem Solving
- A. Free Body Diagrams
- B. Format
- C. Calculations

Unit III — Forces on Rigid Bodies
- A. External
- B. Weight
- C. Normal
- D. Distributed
- E. Friction

Unit IV — Internal Forces on Beams
- A. Shear Bending Diagram
- B. Moment Bending Diagrams

Unit V — Vector Analysis for Rigid Bodies
- A. Trusses
- B. Frames
- C. Machines

Unit VI — Additional Analysis on Rigid Bodies
- A. 2D (Two Dimension)
- B. 3D (Three Dimension)

Learning Activities Required Outside of Class:

The students in this class will spend a minimum of 6 hours per week outside of the regular class time doing the following:

1. Studying assigned text, handout materials and class notes
2. Reviewing and preparing for quizzes, midterm and final exams
3. Completing individual homework assignments with clear calculations and engineering problem solving techniques.

Methods of Instruction:

1. Lecture, demonstrations and discussions
2. Individual homework assignments with emphasis on application of engineering problems solving methods.
3. Individual and group projects with emphasis on in-class exercises with experimental equipment including data acquisition and analysis.

Methods of Evaluation:

1. Quizzes
2. Exams
3. Participation
4. Individual assignments and group exercises
5. Written project reports
6. Oral presentations
7. Case analysis and reports with engineering trade-off design decisions