Butler County College
Behavioral Science, Math, Science,
and Physical Education Division

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Implemented Fall 2007
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COURSE OUTLINE
Statics

Course Description
EN 260. Statics. 3 hours credit. Prerequisites: PH 251 and MA 152 with a C or better. This is a course for pre-engineering students. It will enable the student to solve problems involving composition and resolution of forces, equilibrium of force systems, application of general laws of statics to engineering problems, analysis of simple structures, machine elements, centers of gravity, and moment of inertia.

Course Relevance
This course is a prerequisite for other engineering courses required for an Engineering major. The student will learn techniques used in mechanical, civil, and other types of engineering.

Required Materials
Hibbeler, R. C. *Engineer's mechanics* (*statics).* Upper Saddle River, NJ. Pearson Prentice Hall.

* - For complete textbook information, refer to http://www.butlercc.bkstr.com

Learning Outcomes
The intention is for the student to be able to
1. Apply course concepts to an engineering project
2. Draw correct free-body diagrams
3. Find forces and moments on engineering bodies

Primary Learning PACT Skills that will be DEVELOPED and/or documented in this course
Through the student's involvement in this course, he/she will develop his/her ability in the following primary PACT skill areas:
1. Critical Thinking
   - Through the collection and analysis of data, the student will develop critical thinking skills.

Secondary skills (developed but not documented):
Problem Solving
Field-Related Technology
Reading
Writing
Listening

Major Summative Assessment Task
These learning outcomes and the primary Learning PACT skills will be demonstrated by:

1. Completion of multi-step problems that require the student to integrate the concepts of the course

Course Content

I. Themes – Key recurring concepts that run throughout this course:
   A. Applying mathematical principles to engineering problems
   B. Working as a team
II. Issues – Key areas of conflict that must be understood in order to achieve the intended outcome:
   A. Understanding the tension between simplifying the problem and getting an answer that correctly solves the problem
   B. Resolving the type of technology that should be used to address the problem
III. Concepts – Key concepts that must be understood to address the issues:
   A. Using vectors for forces and moments to reproduce salient physical properties
   B. Using calculators, computers and assorted tools to attack problems
IV. Skills/Competencies – Actions that are essential to achieve the course outcomes:
   A. Techniques of Calculus
   B. Manipulating vectors
   C. Software skills
   D. Geometry
   E. Construction skills

Learning Units

I. Force vectors
   A. Algebra of vectors
   B. Sketching correct vector diagrams

II. Equilibrium of a particle
   A. Free-body diagram
   B. 3D force systems

III. Force system resultants
   A. Moments about a point and an axis
   B. Equivalent systems
   C. Distributed loading

IV. Equilibrium of a rigid body
   A. Free-body diagrams
   B. Equations of equilibrium
   C. Constraints for a rigid body

V. Structural analysis
   A. Trusses
   B. Frames and machines

VI. Center of gravity
    A. Centroid of a body
    B. Composite bodies
    C. General distributed loading

VII. Moments of inertia
    A. Parallel axes theorem
    B. radius of gyration

Learning Activities
Independent learning activities will be assigned to assist the student to achieve the intended learning outcomes. Activities identified in the syllabus, such as class discussion, lecture, reading, in-class presentations, group work or projects will also contribute to learning.

Grade Determination
Grade determination will be based on assessment tasks and other activities such as exams, assignments, group work or projects that the instructor identifies in the syllabus.