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

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Revised Fall 2009
Implemented Fall 2010

COURSE OUTLINE
Engineering Concepts

Course Description
EN 115. Engineering Concepts. 2 hours credit. Prerequisite: MA 060 or its equivalent with a C or better. This course will enable the student to formulate problems and use solution techniques related to engineering through the use of engineering design projects involving software and hardware.

Course Relevance
This course is designed to be an introduction to the field of engineering. The student will determine personal enjoyment and aptitude in solving engineering problems. This course will enable the student to determine which engineering field the student wishes to pursue.

Required Materials
Working Model software is provided. Knowledge Revolution publisher.

Learning Outcomes
The intention is for the student to be able to:
1. Design projects within design constraints.
2. Create software and hardware models.

Learning PACT Skills that will be developed and documented in this course
Through involvement in this course, the student will develop ability in the following PACT skill area(s):

Analytical Thinking Skills
1. Problem solving
   - Through the use of multi-step problems the student will develop problem solving skills.

Technology Skills
1. Discipline-specific technology
   - Through the use of Working Model software the student will develop field-related technology skills.

Major Summative Assessment Task(s)
These learning outcome(s) and the Learning PACT skill(s) will be demonstrated by:
1. Completing an engineering design project that requires several steps which integrates software and hardware.

Course Content
I. Skills or Competencies – Actions that are essential to achieve the course outcomes:
   A. Exhibit number sense

B. Use conversion factors
C. Solve geometrical construction problems
D. Exhibit construction skills
E. Proficiency using modeling software

Learning Units

I. Conversion factors
   A. Metric vs. English
      1. Prefixes
      2. Basic units
   B. Compound units
   C. Density units
   D. Accuracy vs. precision

II. Introduction to Working Model software
   A. Icons
      1. Rectangular body
      2. Springs
      3. Pins
      4. Connectors
      5. Anchors
   B. Object properties
      1. Geometry
      2. Appearance
      3. Properties

III. Presenting data
   A. Graphing model data
      1. Axes
      2. Data range
      3. Exporting data
   B. Throwing arms
      1. Length change
      2. Pivot ratio change
      3. Mass change

IV. Building a model
   A. Working with PASCO building materials
      1. Assembly
      2. Design
   B. Comparing PASCO model to Working Model software
      1. Adjusting parameters
      2. Modeling a 3D object in 2D

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 and other activities at the discretion of the instructor.

Grade Determination
Grade determination will be based on assessment tasks and other activities such as exams, assignments, group work or projects and other methods of evaluation at the discretion of the instructor.