Butler Community College M. Hubbell, Mel Whiteside
Career and Technical Education Division Fall 2008

COURSE OUTLINE
Route Surveying

Course Description
SR 226. Route Surveying. 3 hours credit. Prerequisites: MA 140 and SR 204 with a C or better. This course will enable the student to address conventional and technological methods of route determinations for highways, pipelines, railroad, airports, and waterways. The student will learn about, in depth, aerial photo methods, curves of all types, highway safety, earthwork and a variety of layout methods.

Course Relevance
The concepts and theories taught in this course will allow the student to understand the fundamentals of surveying as applied to transportation methods.

Required Materials:
Meyer, C.F. and Gibson, D.W. (1990). *Route surveying and design* (5th ed.). Harper & Row Publishers

Learning Outcomes
The intention is for the student to be able to:
1. Apply advanced survey math skills
2. Explain route and layout methods
3. Read survey maps
4. Draw a route survey map

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 PACT skill areas:

Analytical Thinking Skills
1. Problem Solving
   - The student will be expected to use survey notes, calculations, and data to solve problems that relate to the completion of route related surveys

Major Summative Assessment Task(s)
These learning outcomes and the Learning PACT skill will be demonstrated by:
1. Completing a practical field project – drawing a route survey map from a set of survey notes, calculations, and data

Course Content
I. Themes - Key recurring concepts that run throughout this course:
   A. Applied mathematics and trigonometry functions of surveying
II. Issues – Key areas of conflict that must be understood in order to achieve the intended outcome:
   A. Reading survey and topography maps

B. Setting up and using survey equipment
C. Recording accurate notes

III. Concepts – Key concepts that must be understood to address the issues:
A. Setting up and using equipment
B. Taking accurate and reliable measurements
C. Recording accurate survey notes
D. Interpreting aerial and ground survey data

IV. Competencies - Actions that are essential to achieve the course outcomes:
A. Set up survey equipment
B. Solve advanced survey math problems
C. Identify key components in route surveying layout
D. Identify safety issues in the layout of transportation systems
E. Read aerial maps

Learning Units

I. Transportation systems
A. Controlling factors
B. Railroads
C. Highways
D. Pipelines
E. Waterways

II. Route surveys by ground and aerial methods
A. Reconnaissance surveys
B. Preliminary surveys
C. Locations surveys

III. Reverse and parabolic curves
A. Two centered compound curves
B. Derivation of formulas
C. Check solution by traverse
D. Reverse curve
E. Reverse curve between parallel tangents
F. Reverse curve between nonparallel tangents

IV. Horizontal curves
A. Useful properties
B. Staking out a horizontal curve

V. Vertical curves
A. Vertical offsets from tangent to curve
B. Elevations along a vertical curve

VI. Special topics and transition spirals
A. Passing a curve through points of fixed elevations
B. Changing position of forward tangent

C. Reverse vertical curves

VII. Spiral curves and highway safety
A. Introduction
B. Notation and formulas
C. Functions of the spiral and curve
D. General procedure for laying out spiral and curve

VIII. Super-elevations and widenings
A. Centrifugal force
B. Banking Highway curves

IX. Earthwork calculations
A. Description
B. Side slopes
C. Roadbed sections
D. Area of cross sections

X. Application of drainage surveys
A. Scope
B. Structure surveys

XI. Railroad curves
A. Introduction
B. Procedure
C. Chords, ordinates, and degree of curvature

Learning Activities
Learning activities will be assigned to assist the student to achieve the intended learning outcomes through lecture, instructor-led class discussion, guest speakers, group activities, drills/skill practice and others at the discretion of the instructor.

Grade Determination
The student will be graded on learning activities and assessment tasks. Grade determinants may include the following: daily work, quizzes, chapter or unit tests, comprehensive examinations, student projects, student presentations, class participation, and other methods of evaluation employed at the discretion of the instructor.