I. **OVERVIEW**

The following information will appear in the 2010 - 2011 catalog

**AGM 230 Field Surveying**

2 Units

*Also offered as:* ENGR - 230: Field Surveying

*Recommended for Success:* Before enrolling in this course, students are strongly advised to satisfactorily complete AG 280 or satisfactorily complete MATH 70.

Selection, care and checking of tapes, levels, GPS and laser systems. Introduction to total station care and use. Field observations, note taking and office computations; use of surveying instruments and equipment for land measurement and mapping; practice in differential, profile and contour leveling; horizontal angles, traverses, and construction problems used in public lands surveying, legal descriptions and county records.

**Materials Fee Required**

Field trips are required. (A-F Only) Lecture /Lab

Transfer: (CSU)

II. **LEARNING CONTEXT**

Given the following learning context, the student who satisfactorily completes this course should be able to achieve the goals specified in Section III, Desired Learning:

A. **COURSE CONTENT**

1. **Required Content:**

   a. Introduction to field surveying

      i. Surveying in general, career opportunities

      ii. Theory of measurements, accuracy, changes in technology

      iii. Field notes and procedures

      iv. Office computations

   b. Linear measurements

      i. Methods used and accuracy achieved

      ii. Taping and chaining

      iii. Instruments

      iv. Pacing and estimation

   c. Layout work with an engineer’s tape

      i. Taping over level terrain

      ii. Taping sloping distances

      iii. Construction of right angles using Pythagorean Theorum, loop-tape, and equilateral
methods

iv. Erection of perpendicular to a line-cord method
v. Triangles-right angles
vi. Building foundations and squares
vii. Parallelograms, trapezoids, and rectangles
viii. Determining inaccessible distances, and passing obstructions with a tape

d. Area measurement by taping calculation of acreage
i. Triangulation
ii. Rectangles, squares
iii. Parallelograms, trapezoids
iv. Regular curved boundaries
v. Irregular curved boundaries

e. Selection, operation, use, care and adjustment of GPS systems, surveying instruments and leveling rods
i. Theory of leveling
ii. Type of leveling methods used
iii. Dumpy levels
iv. Philadelphia rods and reflective prisms
v. Filed notes
vi. Signals
vii. Lasers used in surveying
viii. Global positioning systems (GPS) instruments

f. Field applications of leveling instruments and equipment
i. Differential leveling (cross-sectional)
ii. Using turning points
iii. Determination of average elevation
iv. Grades, slopes and soil compaction
v. Determination of volume of cuts and fills
vi. Profile leveling - drains, trenches, ditches
vii. Direction - bearings, angles
viii. Traversing
ix. Prolonging lines
x. Determining length of inaccessible lines and passing obstacles

g. Introduction to total station instruments
   i. Finding and measuring angles
   ii. Care and operation
   iii. Care and handling of prism rod

h. Boundary surveys - location of properties
   i. Metes and bounds
   ii. Block and lot (subdivisions)
   iii. Townships, sections, and ranges
   iv. Titles, grants, deeds, recordings

i. Survey of public lands
   i. Background history and development of system
   ii. Initial points
   iii. Principal meridians
   iv. Base lines
   v. Standard parallels (correction lines)
   vi. Guide meridians
   vii. Townships
   viii. Sections
   ix. Subdivision of sections
   x. Descriptions
   xi. Corners - witness, lost, obliterated, meandering

j. County Surveyor's Office
   i. Responsibilities and duties of the office
   ii. Records kept
   iii. Authority and liability of licensed surveyors

2. Required Lab Content:
   a. Career opportunities in general surveying
b. Theory of measurements, accuracy, changes in technology

c. Field notes and procedures

d. Office computations

e. Linear measurements

f. Methods used and accuracy achieved

g. Taping and chaining

h. Instruments

i. Pacing and estimation

j. Layout work with an engineer's tape

k. Taping over level terrain

l. Taping sloping distances

m. Construction of right angles using Pythagorean Theorum, Loop-tape, and equallateral methods

n. Erection of perpendicular to a line-cord method

o. Triangles-right angles.

p. Building foundations and spuares.

q. Parallelograms, trapezoids, and rectangles.

r. Determining inaccessible distances and passing obstructions with a tape.

s. Area measurement by taping calculation of acreage

t. Triangulation

u. Rectangels, squares

v. Parallelograms, and trapezoids

w. Regular curved boundaried

x. Irregular curved boundaried

y. Selection, operation, use, cared and adjustement of GPS sustems, surveying equipment, and leveling rods.

a. Laser used in surveying

aa. GPS

ab. Field applicationd of leveling instruments and equipment

ac. Using turning points

ad. Determination of elevations

ae. Grades, slopes and soil compaction

af. Direction, bearings and angles
B. ENROLLMENT RESTRICTIONS

1. Advisories

Before enrolling in this course, students are strongly advised to satisfactorily complete AG 280 or satisfactorily complete MATH 70.

C. HOURS AND UNITS

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<tr>
<th>INST METHOD</th>
<th>TERM HOURS</th>
<th>UNITS</th>
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<tr>
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<tr>
<td>Lab</td>
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D. METHODS OF INSTRUCTION (TYPICAL)

Instructors of the course might conduct the course using the following method:

1. Related material will be presented through designated class lecture and lab and field work.
2. Presentation of additional studies which will be required reading, from technical manuals specific to individual topics.
3. Computer-assisted instructional units in problem-solving, and survey procedures are completed by the student to augment classroom lecture.
4. Assist with demonstration of the mastery of each competency by an outline of a related field lab.
5. Field observation and field trips.
6. Presentation of selected field problems with actual evaluation of on-site performance.
7. Facilitate team work and leadership evaluation.

E. ASSIGNMENTS (TYPICAL)

1. EVIDENCE OF APPROPRIATE WORKLOAD FOR COURSE UNITS

   Time spent on coursework in addition to hours of instruction (lecture hours)

   a. Homework - students are assigned weekly reading assignments related to the weekly topic consisting of a minimum of one hour per week.
   b. Homework - Bi-weekly assignments regarding applicable math and equation calculation.
   c. Weekly quizzes pertaining to the previous week's topic.
   d. Weekly lab assignment pertaining to the skill set desired for the week.

2. EVIDENCE OF CRITICAL THINKING

   Assignments require the appropriate level of critical thinking

   a. Students must evaluate the problem and situation and determine the proper procedure and sequence of events to efficiently complete the task.
   b. Typical midterm question: Part 2 Instrument & Rod -- Using the given instrument and rods determine the elevations at each rod location as compared to location A. Record below

   | Location | Measurement | Elevation |
F. **TEXTS AND OTHER READINGS (TYPICAL)**


III. **DESIRED LEARNING**

A. **COURSE GOAL**

*As a result of satisfactory completion of this course, the student should be prepared to:*

- properly set-up, operate, and record common surveying practices using common surveying tools and techniques.

B. **STUDENT LEARNING GOALS**

*Mastery of the following learning goals will enable the student to achieve the overall course goal.*

1. **Required Learning Goals**

*Upon satisfactory completion of this course, the student will be able to:*

   a. Select, care for, check, adjust, and use in the field of surveying applications, engineer’s tapes, plumb bobs, surveyor pins, stakes, levels, leveling rods, compasses, range poles, and other field survey equipment.

   b. Calculate land areas, cubic yards of dirt moved, closing errors and similar mathematical problems.

   c. Evaluate and define land descriptions.

   d. Conduct accurate field observations and keep complete notes.

   e. Properly set-up, operate, and record common surveying practices using common surveying tools and techniques.

2. **Lab Learning Goals**

*Upon satisfactory completion of the lab portion of this course, the student will be able to:*

   a. Select, care for, check, adjust and use in the field of surveying applications, engineer’s tapes, plumb bobs, surveyor pins, stakes, levels, leveling rods, compasses, range poles and other field surveying equipment

   b. Calculate land areas, cubic yards of dirt moved, closing errors and similar mathematical problems.

   c. Evaluate and define land descriptions.

   d. Perform necessary office computations incident to field surveying jobs.

   e. Analyze surveying data and plot contours and profiles.

IV. **METHODS OF ASSESSMENT (TYPICAL)**

A. **FORMATIVE ASSESSMENT**

1. Neatness, accuracy, and completeness of field notebook.

2. Written examination.

3. Practical “hands-on” skill development.
4. Analytical semester project.

B. **SUMMATIVE ASSESSMENT**

1. A comprehensive final including written, mathematical, and practical applications is given at the end of the semester.