** COURSE (CATALOG) DESCRIPTION**

**SE251:  Surveying Basics**

            Definitions and concepts with a brief descriptions of historical development of surveying.  Principles of survey observations and errors with a fully-worked example.  Basic survey measurements. This overall topic includes:  distance measurements, leveling with its principles and practical aspects, angle measurements.  Use of electronic equipment in field observations.  Applications, which cover a wide variety of topics relevant to the field of plane surveying.

**PREQUISITE**

MATH 107 (Algebra and Analytic Geometry).

** TEXT BOOK(S) AND/OR OTHER REQUIRED MATERIAL**

**** Elementary Surveying:  An Introduction to Geomatics, 10/e  @ 2002, Paul Richard Wolf, and Charles D. Ghilani, Prentice-Hall, Inc.

**** Surveying with Construction Applications, Barry F. Kavanagh, Fifth edition, Prentice-Hall, Inc. (in reserve).

** COUSE OBJECTIVES**

            The goals for the course design are identified to give the students the principles of plane surveying and planimetric maps.  Together with the other survey field work applications, it exposes the student to all traditional surveying measurements to a form useful in engineering projects and earth work problems.  In particular, emphasis is placed to make a balance between theoretical topics and field applications.

** TOPICS COVERED**

**a.         Introduction**

**** Definition of Surveying & Geomatics. Types of Surveying

**** Basic concepts and definitions.  Classification of surveying based on

                        different approaches.

**** Surveying instrumentation.

                      Survey references:  coordinates systems.

**b.         Principles of Survey Observations and Errors**

                      Types of measurements made in surveying and their units

                      Direct and indirect measurements

                      Sources of errors.   Types of errors

                      Probability equation and curve for normal distribution

                      Accuracy, precision and relative precision

                      Example problem.

**c.         Distance Measurements:  Taping**

                      Introduction:  Methods of measuring horizontal distances

                      Equipment and accessories used in taping

                      Systematic taping errors and corrections

                      Field notes and summary for taping

                      Miscellaneous problems.  Obstacles.

**d.         Leveling:  Principles and Practical Aspects**

                      Definitions

                      Difference in elevation between two points: one set up

                      Curvature and refraction

                      Two-peg test

                      Types of levels:  Dumpy, Tilting, Automatic, and Digital

                      Leveling rods

                      Differential leveling:  Definitions, procedure, and errors

                      Profile and cross-sections leveling:  Worked examples

                      Reciprocal leveling.  Grid leveling and contouring

                      Sources of errors in leveling.  Problems.

**e.         Angle Measurements**

                      Principles of angle measurement:  Horizontal angles, Vertical Angles

                      Modern theodolites.  Electronic theodolite.  Direction theodolites

                      Field procedure:  setting up.  Reading and booking

                      Direction of a line:  Azimuths, bearings, and comparison between them.

                        Problems.

**f.          Areas and Volumes**

                      Methods of determining areas:  straight-sided and irregular figures

                      Area by coordinates.  Area by planimeter

                      Partitioning of lands

                        Methods of volume computations:  Average end area formula.                           Prismoidal formula.  Contour area method.  Unit-area, or borrow-pit                      method.

                      Problems.

**        CLASS / LABORATORY SCHEDULE:**

Two 50-minutes lectures and 2-hour lab each week.

**        LABORATORY PROJECTS**

          Training on distance measurements by taping

                      Training on electronic distance measurements

                      Training on the levels and leveling operations:  profile leveling,

                        borrow-pit leveling

                      Training on angle measurements

                      Measuring of areas by planimeter

**        CONTRIBUTION OF COURSE TO MEETING THE**

**PROFESSIONAL COMPONENTS**

                      College-level mathematics and basic sciences:  0 credits

                      Engineering topics:  3 credits

                      General education: 0 credits

**        RELATIONSHIP OF COURSE TO POGRAM OUTCOMES**

Upon completion of the course, students will:

a)Understand the principles of making reconnaissance, sketching, stationing, measuring by taping on level, and slope ground to produce a large scale map.

b)         Apply knowledge of probability and theory of errors to know and analyze the precision and accuracy of the results.

c)         Understand the theory and use of the fundamental ground surveying instrument – the tape, level, theodolite, EMDS, and palnimeter.

d)         Be able to perform profile observations, calculations, and drawing.

e)         Be able to measure horizontal angles by the direction method, and closing the horizon, and vertical angles.

f)         Understand contours characteristics, and the principle of making interpolation to draw them.