COURSE INFORMATION FORM

DISCIPLINE
Land Surveying

COURSE TITLE
Fundamentals of GPS Surveying

CR.HR   3  LECT HR.   3  LAB HR.  CLIN/INTERN HR.  CLOCK HR.  

CATALOG DESCRIPTION

The purpose of this course is to introduce the student and practitioner to the modern practices of satellite with an emphasis on its origins in physical geodesy.

PREREQUISITES
SRVY 135

EXPECTED STUDENT OUTCOMES IN THE COURSE (ESO)
Upon completion of this course, the student will be able to:

1. Describe the evolution of the science of geodesy from its historical roots to the most modern incarnation.

2. Summarize the fundamental differences between plane surveying and geodetic surveying.

3. Classify and contrast the various different GPS surveying techniques currently employed in everyday practice; evaluating both their strengths and weaknesses.

4. Identify and describe the various technological/mechanical components of a typical GPS receiver.

5. Assess the “strength of figure” for a geodetic network.

6. Produce and document data of a character and quality recognized by the MODNR and/or the NGS (blue booking).
GENERAL EDUCATION OUTCOMES (ESO)

Specify which general education outcomes, if any, are substantially addressed by the course. Numbers in parentheses identify the Expected Student Outcomes linked to the specific General Education Outcome.
PROGRAM-LEVEL OUTCOMES

CAREER AND TECHNICAL EDUCATION PROGRAM OUTCOMES
Specify which Career and Technical program outcomes, if any, are substantially addressed by the course by completing the “Career and Technical Education template” to show the relationship between course and program outcomes to assessment measures.

1. Students will apply technical skills and critical thinking skills to solve surveying related problems.
2. Students will work with others by engaging in real world field exercises that relate to land surveying.
3. Students will demonstrate the highest level of professional ethics while applying effective business practices.

CLASS-LEVEL ASSESSMENT MEASURES
Student accomplishment of expected student outcomes will be assessed using the following measures. (Identify which measures are used to assess which outcomes.)

1. Three exams; 2 hourly and a final exam (1, 2, 3, 4, 5, 6)
2. Comprehensive term project (1, 2, 3, 4, 5, 6)
COURSE OUTLINE FORM

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Individual instructors may order this outline as fits the needs of their individual courses. In addition, they may place more emphasis on some areas than on others. What is assured is that this particular list is covered in the course. Other topics may be added to a course as the instructor sees fit, and as time and interest allow. An *asterisk can be used to mark an item as optional.

I. History of geodetic principles
   A. Plane geometry
   B. Origin of earth’s measurement
   C. Evolution of sophisticated study of earth’s surface

II. Basic concepts of earth’s surface approximation

III. Survey positioning techniques
   A. Historic and modern units
   B. Historic and modern terminology

IV. Geodetic systems
   A. Horizontal datums
   B. Vertical datums
   C. Effects of morphogy
   D. Effects of physical forces

V. Physical geodesy
A. Isostasy

B. Gravitational anomalies

VI. Survey of geodetic systems

A. Strengths

B. Weaknesses

VII. Satellite geodesy

A. Origin (before global navigation satellite systems)

B. Repeater beacons

C. Microwave stations

D. Baseline interferometry

E. Other types of remote sensing instrumentation

VIII. Global navigation satellite systems

A. Orbital parameters

B. Signals and embedded coding

C. Pseudo-ranging

D. Carrier phase ranging

E. Sources of error

F. Other systems (Glonass, Galileo, future)

IX. Receivers and methods

A. Equipment

B. Terminology

C. Survey methodology (static, kinematic, RTK)

X. Coordinate geometry

A. Transformations from geodetic positions to planar equivalents

B. Geoid modeling
C. Compare WGS84 and NAD83 horizontal datum

XI. Survey planning
   A. Standards of geodetic accuracies
   B. Analyze “strength of figure”
   C. Applications of post processing and expectation of error

XII. Monumentation
   A. Documentation
   B. Data acquisition

XIII. Modern practical methods
   A. RTK
   B. Localization
   C. Source of error
   D. Methods of data collection
   E. Probability of data