

COURSE CODE: GIE-415
COURSE NAME: GPS SURVEYING
CREDIT HOURS: Theory = 01
 Practical = 02
 Total = 03
CONTACT HOURS: Theory = 16
 Practical = 96
 Total = 112
PREREQUISITE: Nil

MODE OF TEACHING:

Instruction One hour of lecture per week 33%
 Practical: Six hours of Lab work per week 67%

COURSE DESCRIPTION:

This course is the follow up of Surveying-I in which students were taught basic surveying skills by doing most of the data acquisition with manual measurements.

In this course all the practical work is done by using the modern hardware and software. Field data is acquired and stored in the Total Stations and GNSS Receivers. It is downloaded in the computers in the lab and further processed by using computer software (Micro Survey CAD) The output, which is in the shape of maps, is plotted on colour plotters for field users.

COURSE OBJECTIVES:

To learn the principles and techniques of advanced surveying and carryout survey tasks by using modern survey instruments and software.

RELEVANT PROGRAM LEARNING OUTCOMES (PLOs):

The course is designed so that students will achieve the PLOs:

- | | | | | | |
|---|----------------------------------|-------------------------------------|----|---|-------------------------------------|
| 1 | Engineering Knowledge: | <input checked="" type="checkbox"/> | 7 | Ethics: | <input type="checkbox"/> |
| 2 | Problem Analysis: | <input type="checkbox"/> | 8 | Individual and Collaborative Team Work: | <input checked="" type="checkbox"/> |
| 3 | Design/Development of Solutions: | <input type="checkbox"/> | 9 | Communication: | <input type="checkbox"/> |
| 4 | Investigation: | <input type="checkbox"/> | 10 | Project Management: | <input type="checkbox"/> |
| 5 | Tool Usage: | <input checked="" type="checkbox"/> | 11 | Lifelong Learning: | <input type="checkbox"/> |
| 6 | The Engineer and Society: | <input type="checkbox"/> | | | |

COURSE LEARNING OUTCOMES:

On successful completion of this course, students will be able to:

| No. | CLO | Domain | Taxonomy Level | PLO |
|-----|---|-------------|----------------|-----|
| 1 | Demonstrate advanced survey concepts for application to geo-informatics engineering. | Cognitive | 3 | 1 |
| 2 | Demonstrate efficiency in handling of advanced survey equipment. | Psychomotor | 4 | 5 |
| 3 | Commit to individual or group survey task as a leader or member expressing team spirit and inspiring conduct. | Affective | 3 | 8 |

PRACTICAL APPLICATIONS:

- Modern survey instrument like Total Station and Digital Levels are frequently being used on all Civil Engineering sites now a day. Different survey software is also being used for processing survey field data. Therefore, our graduates will feel comfortable and confident with the present-day field environment after having learnt this course.
- At certain sites GNSS equipment is also available for fast acquisition of survey data. The familiarity of our graduates with this technology will enable them to use it efficiently.
- While executing a project spread over vast area, an engineer may be required to use many maps. Hence it is essential for the students to understand the National Mapping Grid System of the country. Topics like Geodesy and Map Projections are useful in this regard.
- Photogrammetry is a very fast method of surveying, and it can be used effectively when large survey work is required to be done in a short period of time.

TOPICS COVERED:

Theory:

| Week | Topic |
|-------|--|
| 1 | Introduction to modern surveying |
| 2 | Triangulation |
| 3 | Trigonometric levelling |
| 4 | Tachometry |
| 5 | Surveying using total station |
| 6 | Topographic mapping and alignment using total station |
| 7-8 | Introduction to Micro Survey CAD software and its use for different survey applications |
| 9 | GPS Surveys |
| 10 | Technological developments leading to GNSS |
| 11 | GNSS Constellation as control points |
| 12 | Trilateration using GPS (as a complex form of triangulation) |
| 13 | GPS signal structure (C/A and P-Code) |
| 14 | GPS Errors and biases |
| 15 | GRID I and GRID II for Pakistan |
| 16 | Setting out of works/*Linear regression models for survey dynamics mapping for error estimation. |
| 17-18 | ESE |

Practicals:

| No. | Topic |
|-----|---|
| 1 | Triangulation. |
| 2 | Trigonometric Levelling. |
| 3 | Tachometry. |
| 4 | Mapping total station data |
| 5 | Demonstration and use of GPS simulator |
| 6 | Processing topographic mapping data on micro–Survey CAD Software. |
| 7 | Use of GNSS for static surveys |
| 8 | Use of GNSS in differential mode |
| 9 | Use of GNSS in RTK mode |
| 10 | Processing field data from GPS |
| 11 | Field data conversion to popular ESRI formats |
| 12 | Setting out of works. |

TEXT AND MATERIAL:**Textbook (s):**

- a. GPS for land surveyors by Van Sickle, J., 2008.
- b. Survey & Levelling by T.P. Kanetkar and S.V.Kulkarni (Vol -I & Vol -II)
- c. Surveying Principles and Applications by Barry Kavanagh

Reference Material:

- a. Survey for Engineers by John Uren & Bill Price

ASSESSMENT SYSTEM:**1. CLOs Assessment**

| Cognitive | Psychomotor | Affective |
|------------------|--------------------|------------------|
| Spreadsheet | Rubrics | Rubrics |

2. Relative Grading

| | | | |
|-------------------------|--------------------------|-----|-------------|
| Theoretical/Instruction | | | 33% |
| | Assignments10% | | |
| | Quizzes10% | | |
| | Mid Semester Exam30% | | |
| | End Semester Exam50% | | |
| Practical Work | | | 67% |
| Laboratory Work | | 70% | |
| | Laboratory Attendance20% | | |
| | Laboratory Report20% | | |
| | Laboratory Quiz30% | | |
| Viva/Quiz | | 30% | |
| Total | | | 100% |