

DEPARTMENT OF CIVIL ENGINEERING
Guidelines and Syllabus for “Geoinformatics” (CE331A) course

Course No.: CE-331A, Geoinformatics (3-0-2-11)

Lectures: 8.00-9.00, L5: Tuesday, Wednesday and Thursday.

Laboratory: 14.00-16.00, Geoinformatics Lab (WLE115): Monday, Tuesday and Thursday.

This course consists of three lectures and one two-hour lab for each group with an objective to learn survey engineering. Objective of the course is to prepare students to understand basics of Land Surveying so that they are ready to execute mapping and setting out of projects. Besides lectures, the course will provide exposure to various laboratory instruments such as level, electronic theodolite, total station, GPS, and use of data processing software.

Sr. no.	COURSE CONTENT	Lectures
1.	Basic concepts of surveying: Objectives; Basic measurements, control networks, locating topographic details; Units of measurement; Error in measurement and their types, indices of precision, weight, outliers; Error sources, types; accuracy and precision, propagation of variance/covariance	4
2.	Linear measurements: Taping; Optical distance measurement; Electronic distance measurement, classification and calibration; Errors in distance measurement and precautions	4
3.	Vertical control: Level surface; Levelling principles, determination of height, leveling instruments; Sources of error and minimization, curvature and refraction effects; closure tolerances; Types of levelling; Characteristics of contours; methods of contouring	4
4.	Angle measurements: Concept of direction, azimuth, meridian; Theodolite, fundamental characteristic of theodolite and adjustment, measuring angles, sources of error	3
5.	Adjustments: Adjustment of errors using observation equation and condition equation approach (matrix-based solution)	5
6.	Control surveys: Traversing, Triangulation, Trilateration, and Triangulation: types, field procedure, error minimization	4
7.	Coordinate systems and datum transformation: Important surfaces in geodesy: earth surface, geoid, MSL, reference ellipsoid; Reference systems: 2D and 3D coordinate systems and transformations; map projection, UTM projection	5
8.	Total station surveys: Principles, classification, salient features of total station	2
9.	GPS survey: Principles, errors, DGPS, DOP, GPS survey Methods and plans	5
10.	Construction survey: Principle of setting out; Special instruments for setting out: Setting out a building, Setting out a highway curve	4
	Total	40

Evaluation Scheme

There will be two main examinations (mid-sem, end-sem) to judge the conceptual understanding of the subject and further the analytical comprehension, and presentation. Performance of a student will be evaluated according to the overall performance at the end of the semester through the following continuous evaluation approach:

Sl. No.	Details	Weightage (%)
1	Mid-Sem Exam	25
2	Quizzes (4 nos.)	15
3	Laboratory Exercises	15
4	Lab Exam	10
5	End Sem Exam	35
	Total	100

The *Mid-Sem* and *End-Sem* will be written examinations, conducted on the dates as per the Academic Calendar. The *Mid-Sem* will be designed for specified course content to be announced in the class and will be of two-hour duration. The *End-Sem* will cover the entire syllabus of the course and will be of three-hour duration.

Laboratory exercises

These exercises consist of laboratory exercises (requiring field data collection and processing by using suitable SW). Software used for mapping surveyed data are QGIS, ILWIS (Open source mapping software).

Guidelines for submission of Laboratory exercises

1. Reports should be hand written.
2. All students should submit independent reports. Group reports will not be accepted.
3. Copying of reports would result in awarding of ZERO marks.
4. For any late submission up to two days, the weightage would be reduced to 50%. Delayed submission beyond that time will not be graded.

References

Text Books

1. Schofield, W., *Engineering Surveying*, 6e, Butterworth Heinemann, Oxford.
2. Arora, K. R., *Surveying*, Standard Book House, Delhi.

Reference books

1. Anderson, J.M. and Mikhail, E.M., *Surveying theory and practice*.
2. Wolf, P.R. and Ghilani, C.D., *Elementary surveying, an introduction to Geomatics*.
3. Sickel, J. V., *GPS for Land Surveyors*, 2e.

Laboratory exercises

#turns (total 13)

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| 1. Map reading: Map numbering with SOI sheet | 1 |
| 2. Linear measurements: chains, tapes, EDM (including calibration) | 2 |
| 3. Elevation measurement: Fly leveling and adjustment | 1 |
| 4. Angle measurement: compass, digital theodolite, quadrilateral adjustment | 2 |
| 5. Total station: topographic surveys (control set up and detailed plotting) | 5 |
| 6. Use of GPS for mapping and control establishment | 2 |

Communication

For any course related difficulty or clarification, please contact the following.

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