

Subject Description Form

Subject Code	LSGI3382A
Subject Title	Survey Instrumentation
Credit Value	3
Level	3
Pre-requisite	LSGI2373 Surveying
Objectives	<p>The objectives of this subject are:</p> <ol style="list-style-type: none"> 1. To provide an understanding of the fundamental principles of different surveying instrumentations. 2. To enable students become skilful in operating modern surveying equipment 3. Students' communication skill, leadership and cooperative attitudes of work with others will be developed through group field practical.
Intended Learning Outcomes	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> 1. Explain the principles of level instruments and the errors for leveling (L3) and be skilful on calibrating errors in leveling instrument (L2) 2. Explain the principle of angle measurements, the structure of theodolite, error sources and describe the calibration methods (L3) 3. Explain the principle of distance measurements with different instruments and be able to identify and calibrate the errors in distance measurements (L3) 4. Explain the fundamental principle of positioning with GNSS and carry out satellite surveying tasks with GNSS (L3)
Subject Synopsis/ Indicative Syllabus	<p>A. Levels Instrument for precise leveling Digital level Sources of errors and their reduction Calibration of leveling instrument</p> <p>B. Angle Measurements Principle of angle measurement Components of an optical theodolite Errors in angle measurements Electronic theodolite</p>

	<p>Calibration of a theodolite</p> <p>C. Distance Measurements Errors in steel tape and calibration Electromagnetic Distance Measurement (EDM) Phase comparison and pulse methods Error sources and corrections Calibration of EDM</p> <p>D. Total Stations Feature of total stations Specialized total stations</p> <p>E. Global Positioning System Concepts of GPS GPS observation Stand-alone Positioning, concepts of GDOP Differential GPS Relative positioning using carrier phase measurements GPS for surveying Static surveys, kinematic surveys</p>
<p>Teaching/Learning Methodology</p>	<ul style="list-style-type: none"> • Lectures will be used to introduce the subject materials. • Field practical will be designed to let student be skillful with different surveying instruments and calibration methods. • Group activities will be conducted in practical sessions to enhance the team spirit, communication skills, problem solving skill, leadership and presentation skill.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
			1	2	3	4
	1. In-class practicals	50	√	√	√	√
	2. Phase Tests	50	√	√	√	√
Total	100 %					
<p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <p>Continuous assessment consists of two components, phase tests and practical work. Two phase tests will be given to assess students' basic understanding of various surveying instruments, error sources, and calibration methods. Practical work will be used to assess students' ability to be skillful to use various surveying instruments for different surveying tasks and calibrate various surveying instruments.</p>						
Student Study Effort Expected	Class contact:					
	▪ Lectures		26 Hrs.			
	▪ Tutorial		13 Hrs.			
	▪ Practicals		26 Hrs.			
	Other student study effort:					
	▪ Self-study, reading and revision		40 Hrs.			
	Total student study effort		105 Hrs.			
Reading List and References	<ol style="list-style-type: none"> 1. C. Russell, <i>The Surveying handbook</i>, ed. Chapman and Hall 2. R.G. Bird, <i>EDM traverse Measurement, computation, and adjustment</i>; John Willey & Sons 3. W. Schofield, <i>Engineering surveying</i>, Butterworth-Hanemann Ltd 4. J. Clendinning and J.G. Olliver, <i>Principles and use of surveying instruments</i>, Van Nostrand Reenhold Company 5. J. Van Sickle, <i>GPS for land surveyor</i>, Ann Arbor Press 					

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| | <ol style="list-style-type: none">6. A. Leick, <i>GPS satellite surveying</i>, John Willey & Sons7. C.D. Burnside, <i>Electromagnetic Distance Measurements</i>, BSP Professional books |
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