Subject Description Form

Subject Code	LSGI522
Subject Title	Spatial Data Acquisition
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	This is a bridging subject designed for non-land surveying background students. Those students with land surveying background are not recommended to take this subject.
Objectives	Provide a foundation on the concepts of acquiring two- and three-dimensional spatial data and awareness of the various concepts and technologies adopted by the Geomatics industry for the collection and processing of the spatial data content that may be used in a GIS.
Intended Learning Outcomes	Student will: a. be able to discuss the merits and demerits of adopting different figures for the shape of the Earth; b. compare the application of different map projections to mapping projects; c. explain the limitations of using plane surveying as a topographic mapping technique; d. convert a map specification of scale and contour interval into a specification for the acquisition of aerial photography and plan the necessary control survey; e. compare the different types of laser scanning on the basis of the technologies involved and the products created; f. describe the operating principle and compare the various field methods of satellite positioning; g. articulate the basic issues relating to the integration of disparate sources of topographic data covered in this topic.
Subject Synopsis/ Indicative Syllabus	• Map projections and geo-reference systems. The shape of the Earth and its various representations. • Conventional field surveying instrumentation and techniques with a focus on topographic mapping. Measuring angles, distances, heights, and positions with theodolites, levels and total stations. • Photogrammetry. Airborne photogrammetric concepts and applications including orientation, modelling of natural and man-made objects and mapping products. • Laser scanning. Airborne and terrestrial systems. An introduction to the technology, the products they create and their applications. • Satellite positioning systems. The concepts and operation of GNSS.
Teaching/Learning Methodology	A variety of methodologies may be used in the subject including lectures to introduce key components; seminars and guided study to stimulate group

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<tr><td></td><td>discussions on selected topics; assignments to develop further generic research and writing skills, projects to stimulate critical thinking, problem solving and team work; presentations to develop professional communication skills; and self-study to reinforce the subject material.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="7">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a.</td><td>b.</td><td>c.</td><td>d.</td><td>e.</td><td>f.</td><td>g.</td></tr>
<tr><td>Continuous assessment</td><td>60%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Final examination</td><td>40%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100%</td><td colspan="7"></td></tr>
</table>
Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Examination is used to assess the core knowledge and understanding of the subject material. Because of the broad scope of the subject open-book exams are held and students can bring a variety of material. Questions are designed to test how students can identify key issues and integrate information rather than quote textbook answers.
Continuous assessment tasks include and the completion of group projects, and presentations related to the projects. The rubrics for these assessment components emphasise the technical knowledge and the professional competencies involved, and also take into account the effective use of Generative AI. When presentations are held, as well as the subject leader, all class members are required to assess their classmates. The feedback from all assessments is collated and returned to the presenting students for their review and reflection.

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<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lectures</td><td>26 Hrs.</td></tr>
<tr><td>▪ Practical</td><td>13 Hrs.</td></tr>
<tr><td>Other student effort:</td><td></td></tr>
<tr><td>▪ Assignments</td><td>48Hrs.</td></tr>
<tr><td>▪ Self study</td><td>52Hrs.</td></tr>
<tr><td>Total student study effort:</td><td>139Hrs.</td></tr>
</table>
</td></tr>
<tr><td>Reading List and References</td><td><u>Books</u>
Chen, Y.Q. and Y.C. Lee, 2001. Geographical data acquisition. Springer.
Gomarasca, M.A., 2009. Basics of geomatics. SpringerLink e-book.</td></tr>
</table>

Grafarend, E.W. & F.W. Krumm, 2006. *Map projections. Cartographic information systems*. SpringerLink e-book.

Hofmann-Wellenhof, B., H. Lichtenegger, E. Wasle, 2008. *GNSS - global navigation satellite systems GPS, GLONASS, Galileo, and more.* SpringerLink e-book.

Iliffe, J., Lott, R., 2008. *Datums and Map Projections: For Remote Sensing, GIS and Surveying*, Second Edition, Whittles Publishing.

Kavanagh, B.F., 2006. *Surveying: Principles and applications*. 7th ed. Pearson/Prentice Hall.

Konecny, G., 2003. *Geoinformation remote sensing, photogrammetry and geographic information systems*. Taylor & Francis e-book.

Leick, A., 2004. *GPS Satellite Surveying*, John Wiley & Sons.

Vosselman, G., & Maas, H. G. 2010. Airborne and terrestrial laser scanning. CRC press.

Maling, D.H. (1992). *Coordinate Systems and Map Projections*. 2nd ed. Pergamon Press.

McCormac, J.C., 2013. *Surveying*. 6th ed. Wiley.

Mikhail, E.M., J.S. Bethel and J.C. McGlone (2001). *Introduction to Modern Photogrammetry*. John Wiley & Sons, New York.

Robinson, A.H, J.L. Morrison, P.C. Muehrecke, A.J. Kimerling & S.C. Guptill (1995). *Elements of Cartography*. 6th Ed. John Wiley & Sons, New York.

Schofield, W., 2007. *Engineering surveying*. 6th ed. Butterworth Heinemann.

Seeber, G., 2003. *Satellite Geodesy*. 2nd ed. Water de Gruyter.

Uren, J., 2010. *Surveying for engineers*. 5th ed. Palgrave Macmillan.

Van Sickle, J., 2008. *GPS for land surveyors*. 3rd ed. CRC Press.

Wolf, P.R., Dewitt, B.A., 2013. *Elements of Photogrammetry with Applications in GIS*, McGraw-Hill Education

<u>Journals</u>

Journal of Geodesy

ISPRS Journal of Photogrammetry and Remote Sensing

Photogrammetric Engineering and Remote Sensing

Survey Review