

# Unit Outline (Higher Education)

**Institute / School:** Institute of Innovation, Science & Sustainability

**Unit Title:** Geomatics Engineering

**Unit ID:** ENGRG4101

**Credit Points:** 15.00

**Prerequisite(s):** ENGRG2105

**Co-requisite(s):** Nil

**Exclusion(s):** ENGIN3204

**ASCED:** 030999

**Description of the Unit:**

This unit is designed to provide students with both theoretical knowledge and practical skills essential for precise geometric measurements using engineering surveying techniques and principles. Students will learn to generate accurate positions of points and coordinates of them and effectively utilise this data in the geometric design of civil engineering infrastructure, with a specific focus on geometric design of roadway systems. The main topics covered include Planimetric measurements, Elevation measurements, Angular measurements, generation of Long sections, Cross sections and Geodetic coordinates, Area & volume estimations, Geometric design of Roads.

**Grade Scheme:** Graded (HD, D, C, P, MF, F, XF)

**Work Experience:**

No work experience: Student is not undertaking work experience in industry.

**Placement Component:** No

**Supplementary Assessment:** Yes

Where supplementary assessment is available a student must have failed overall in the Unit but gained a final mark of 45 per cent or above, has completed all major assessment tasks (including all sub-components where a task has multiple parts) as specified in the Unit Description and is not eligible for any other form of supplementary assessment

**Course Level:**

Level of Unit in Course	AQF Level of Course					
	5	6	7	8	9	10
Introductory	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Intermediate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	✓	<input type="checkbox"/>	<input type="checkbox"/>
Advanced	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Learning Outcomes:

On successful completion of the unit the students are expected to be able to:

#### Knowledge:

- K1.** Explain the fundamentals and theory of engineering surveying
- K2.** Display a coherent theoretical and technical knowledge of a range of surveying instruments, survey techniques, computational methods used in engineering surveying
- K3.** Describe the appropriate use of engineering surveying data in the development and execution of engineering projects, in particular in geometric design of roadway elements

#### Skills:

- S1.** Use a range of modern surveying instruments.  
Organise and conduct a small scale engineering survey project.
- S2.** Analyse and evaluate appropriate computational techniques to process survey data
- S3.** Produce maps, plans and digital data required for the design and construction of engineering projects
- S4.** Design geometric elements of roadway systems

#### Application of knowledge and skills:

- A1.** Apply appropriate surveying techniques to collect survey data
- A2.** Apply appropriate computation techniques to produce maps and plans for Engineering projects
- A3.** Apply Engineering Surveying data in Geometric Design of Roadway Elements

#### Unit Content:

Topics may include:

- Basic surveying instrumentation and techniques for the measurements of lengths, elevations and angles
- The Engineering survey techniques used in the provision of survey control, engineering detail surveys and the layout of engineering projects
- The computation and processing methods used in engineering surveying, including development of Long sections, cross sections, coordinate systems, computer processing and the plotting and presentation of data.
- Geometric Design of Roads:
  - Principles of geometric design: Factors influencing roadway design, including traffic volume, speed, and terrain.
  - Horizontal alignment: Designing the horizontal layout of roads, including curves, tangents, and spirals.
  - Vertical alignment: Designing the vertical profile of roads, including grades, cross slopes, and vertical curves.
  - Superelevation and transition curves: Techniques for ensuring safe and efficient vehicle operation on curved sections of roads.
  - Cross-sectional elements:

**Learning Task and Assessment:**

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
K1,K2, S1-S4, A1, A2	Organise and conduct Engineering Surveying practical(s) and produce maps & plans	Written report(s) and maps	10 - 40%
K3, S4, S5, A2. A3	Design of Geometric elements of roadways	Design reports/ Maps	10 - 40%
K1, K2, K3, S3-S4, A1-A3	Tests and/or examinations based on a range of theoretical problems relevant to measurement of geometric data for engineering projects in any or all of the material covered in the unit.	Quizzes/ Test(s) and/or examination(s)	20 - 50%

**Adopted Reference Style:**

IEEE

Refer to the [library website](#) for more informationFed Cite - [referencing tool](#)