



# Course Outline (Higher Education)

<b>School:</b>	School of Engineering, Information Technology and Physical Sciences
<b>Course Title:</b>	SMART ENGINEERING TECHNOLOGIES
<b>Course ID:</b>	ENGIN5508
<b>Credit Points:</b>	15.00
<b>Prerequisite(s):</b>	(ENGIN3001)
<b>Co-requisite(s):</b>	Nil
<b>Exclusion(s):</b>	Nil
<b>ASCED:</b>	030303

**Description of the Course :**

ENGIN5508 SMART ENGINEERING TECHNOLOGIES introduces some technologies demanded in modern engineering practices, including, but not limited to, modern tunnelling technologies, sensor technologies, industrial robots, data analytics and artificial intelligence. It aims to enable the students ready for tomorrow's professionals in engineering and applied science.

**Grade Scheme:** Graded (HD, D, C, etc.)

**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 course but gained a final mark of 45 per cent or above and submitted all major assessment tasks..

**Program Level:**

Level of course in Program	AQF Level of Program					
	5	6	7	8	9	10
Introductory	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Intermediate	<input type="checkbox"/>	<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:**

This course qualifies students to apply smart or emerging technologies for engineering applications. Students enrolled in this courses will be exposed to a range of technologies, including, but not limited to, modern tunnelling technologies, sensor technologies, industrial robots, data analytics and artificial intelligence, empowering students to undertake engineering professional practices using smart technologies in the digital era.

**Knowledge:**

- K1.** Explain shaft sinking and tunnelling by drilling and blasting method.
- K2.** Describe mechanised tunnelling method.
- K3.** Identify sensing technologies for engineering application.
- K4.** Observe engineering applications of robots.
- K5.** Recognise engineering applications of data analytics.
- K6.** Review engineering applications of artificial intelligence.

**Skills:**

- S1.** Select appropriate tunnelling method for applications in mining and civil engineering.
- S2.** Analyse tunnelling projects and provide solutions to complex underground tunnelling problems.
- S3.** Investigate emerging technologies for engineering applications to improve performance, including, but not limited to, new tunnelling technologies, sensor technologies, industrial robots, data analytics and artificial intelligence.

**Application of knowledge and skills:**

- A1.** Evaluate, plan, and implement a tunnelling system for a project.
- A2.** Apply emerging technologies for engineering applications to improve performance, including, but not limited to, new tunnelling technologies, sensor technologies, industrial robots, data analytics and artificial intelligence.

**Course Content:**

Topics may include:

- Tunnelling by drilling and blasting.
- Mechanised tunnelling.
- Sensor technologies.
- Industrial robots.
- Data analytics.
- Artificial intelligence.

**Values:**

- V1.** Adapt to emerging technologies for engineering applications to improve performance, including, but not limited to, new tunnelling technologies, sensor technologies, industrial robots, data analytics and artificial intelligence.

**Graduate Attributes**

The Federation University FedUni graduate attributes (GA) are entrenched in the Higher Education Graduate Attributes Policy (LT1228). FedUni graduates develop these graduate attributes through their engagement in explicit learning and teaching and assessment tasks that are embedded in all FedUni programs. Graduate

attribute attainment typically follows an incremental development process mapped through program progression. **One or more graduate attributes must be evident in the specified learning outcomes and assessment for each FedUni course, and all attributes must be directly assessed in each program**

Graduate attribute and descriptor		Development and acquisition of GAs in the course			
		Learning Outcomes (KSA)	Code A. Direct B. Indirect N/A Not addressed	Assessment task (AT#)	Code A. Certain B. Likely C. Possible N/A Not likely
GA 1 Thinkers	Our graduates are curious, reflective and critical. Able to analyse the world in a way that generates valued insights, they are change makers seeking and creating new solutions.	K1-K6, S1-S3, A1-2	A	Assignments and reports	A
GA 2 Innovators	Our graduates have ideas and are able to realise their dreams. They think and act creatively to achieve and inspire positive change.	S1-S3, A1-2	A	Reports	A
GA 3 Citizens	Our graduates engage in socially and culturally appropriate ways to advance individual, community and global well-being. They are socially and environmentally aware, acting ethically, equitably and compassionately.	S1-S3, A1-2	A	reports	A
GA 4 Communicators	Our graduates create, exchange, impart and convey information, ideas, and concepts effectively. They are respectful, inclusive and empathetic towards their audience, and express thoughts, feelings and information in ways that help others to understand.	K1-K6, S1-S3, A1-2	A	Assignments and reports	A
GA 5 Leaders	Our graduates display and promote positive behaviours, and aspire to make a difference. They act with integrity, are receptive to alternatives and foster sustainable and resilient practices.	S1-S3, A1-2	B	Reports	B

### Learning Task and Assessment:

Learning Outcomes Assessed	Learning Tasks	Assessment Type	Weighting
K1-2, S1-2, A1	Numerical and conceptual tasks	assignments	15-30%
K3-6, S3, A2	Up to three projects covering tunnelling technologies, sensor technologies, industrial robots, data analytics or artificial intelligence, or other emerging technologies specified by the course coordinator.	reports	70-85%

### Adopted Reference Style:

Other (IEEE)