

# UNSW Engineering Education Specification

## 1. Program Overview

Program Title: Bachelor of Engineering (Honours)

Award Title: Bachelor of Engineering (Honours) (Electrical Engineering)

Engineering Discipline: Electrical Engineering

The Bachelor of Engineering (Honours) in Electrical Engineering (Program Code: 3707, Plan Code: ELECAH3707) is a four-year full-time program requiring the completion of 192 Units of Credit (UoC). It is designed to equip students with a strong foundation in mathematics, physics, computing, and engineering design, followed by advanced studies in electrical engineering. Its structure ensures that graduates develop both technical expertise and professional skills required for contemporary engineering practice.

The program is explicitly mapped to the Engineers Australia Stage 1 Competency Standard, ensuring graduates demonstrate:

- *Knowledge and Skill Base:* Mastery of electrical engineering principles including electrical/electronic devices, circuits and systems; electromagnetics; energy systems; control systems; signal processing; and communications technology.
- *Engineering Application Ability:* Capacity to apply theory to practice through laboratory work, design projects, and a capstone thesis.
- *Professional and Personal Attributes:* Development of ethical awareness, teamwork, leadership, communication, and lifelong learning skills through embedded professional practice courses and general education requirements.

In terms of the rationale for program title and discipline focus, the title *Bachelor of Engineering (Honours) (Electrical Engineering)* reflects both the academic depth and professional orientation of the program:

- *Bachelor of Engineering (Honours)* indicates a four-year program with a significant research and design component, culminating in a thesis.
- *Electrical Engineering* specifies the discipline focus, highlighting the program's emphasis on the generation, transmission, and application of electrical energy, electrical/electronic systems and related technologies. The discipline focus is justified by the ongoing national and global need for engineers capable of contributing to the safe, efficient, and sustainable development of electrical infrastructure and emerging energy systems as well as modern telecommunications and signal processing.

## 2. Career Alignment

ELECAH3707 gives students a broad and deep foundation in engineering science – both theoretical and practical – that prepares them for a wide variety of career pathways across many established and emerging industry sectors. The curriculum progressively develops professional capabilities aligned with Engineers Australia Stage 1 Competencies, enabling graduates to transition effectively into professional practice and evolving industry expectations.

### 2.1. Alignment with Industry Sectors and Workforce Needs

ELECAH3707 equips students with knowledge and skills relevant to major engineering sectors in Australia and internationally, including:

- **Power, Energy, and Utilities:** Students gain depth in power circuits and systems analysis, power electronics and drives, protection, renewable energy integration, and grid management. Through laboratory work and design projects, graduates are prepared for roles in electricity generation, transmission, distribution, and renewable-energy deployment—key national priorities in energy transition and decarbonisation.
- **Electronics, Embedded Systems, and Hardware Engineering:** The curriculum provides comprehensive coverage of analogue/digital electronics, microcontrollers, embedded system design, instrumentation, and sensor technologies. Graduates are prepared for roles in consumer electronics, medical devices, industrial instrumentation, defence electronics, and advanced manufacturing.
- **Communications and Networking:** Core training in signals and systems, communication theory, wireless systems, and network fundamentals prepares graduates for roles in telecommunications, mobile networks (4G/5G/6G), satellite systems, underwater communications and IoT connectivity—areas essential to Australia’s digital-infrastructure growth.
- **Control Systems, Automation, and Robotics:** Students learn modern control theory, automation, and real-time systems, enabling them to work in industrial automation, robotics, smart manufacturing, mining technologies, space technologies and autonomous systems—high-demand sectors within Australian industry.
- **Emerging Technologies and Cross-Disciplinary Fields:** Through elective courses, research projects, and industry-linked activities, students engage with emerging areas such as smart grids, energy storage systems, electric vehicles, power-electronic conversion, smart cities, cybersecurity for critical infrastructure, and AI-enabled embedded systems. This ensures graduate readiness for rapidly evolving technologies and multidisciplinary environments.

### 2.2. Preparation for Professional Engineering Practice

ELECAH3707 structure ensures students progressively develop the capabilities expected of an entry-level professional engineer, through:

- **Strong Engineering Science and Analytical Capability:** Core courses ensure mastery of circuit theory, electromagnetics, signals and systems, electronics, power systems, and control – enabling graduates to analyse complex engineering problems and apply engineering methods with rigour.
- **Design Skills and Systems Integration:** Students undertake scaffolded design experiences culminating in a final-year thesis. These activities foster the ability to design, implement, and evaluate engineering solutions, integrating electrical engineering with software, mechanical, and communication subsystems.

- **Laboratory, Simulation, and Practical Skills:** Hands-on learning in laboratories, test environments, and computer-based modelling develops practical competence in measurement, instrumentation, prototyping, verification, and safety procedures – critical for work-readiness in industrial settings.
- **Professional Conduct, Ethics, and Standards:** The curriculum embeds engineering ethics, risk management, sustainable practice, WHS fundamentals, and exposure to relevant standards (e.g., AS/NZS, IEC, IEEE) to ensure graduates meet professional expectations and regulatory obligations.
- **Teamwork, Communication, and Project Management:** Students work in multidisciplinary teams and deliver industry-style technical communication, preparing them for professional collaboration, stakeholder engagement, and project delivery roles in consultancy, utilities, and engineering firms.
- **Industry Engagement and Work-Integrated Learning:** Industry placements, guest lectures, industry-led projects, and external collaborations give students exposure to real-world engineering environments, professional practices, and employer expectations.

### 2.3. Typical Career Pathways

ELECAH3707 graduates commonly progress into roles such as:

- **Electrical Design Engineer** – design electrical systems for industrial processing and manufacturing plants.
- **Electronics Engineer** – design smart tools, sensors, gadgets and robotics.
- **Power Systems Engineer** – design, manage and operate the electricity supply networks.
- **Renewable Energy Engineer** – work with sustainable solar, wind and battery systems.
- **Control Systems Engineer** – automate factories and smart tech.
- **Embedded AI Engineer** – integrate AI algorithms for real-time decision-making in devices like drones and autonomous vehicles.
- **Satellite and Radar Engineer** – build space and defence systems.
- **Telecommunications Network Engineer** – develop mobile phone systems and internet infrastructure.
- **Systems Engineer** – infrastructure, defence, transport.
- **Graduate Engineer** – work in utilities, manufacturing, transport, mining, consulting, and technology sectors.

## 3. Specialisation Framework

The Specialisation Learning Outcomes (SLOs) were developed through rigorous internal consultations (School and Engineering Faculty). In the first stage at the school level, working groups were formed with members of academic teaching staff from various disciplinary areas to formulate the SLOs. The SLOs were reviewed by the School's Academic Executive Committee (AEC). External consultations were then sought from the School's Industry Advisory Board (IAB) for their advice and feedback, particularly the expectation of industry with regards to graduate capabilities. The Engineering Faculty Education Committee (FEC) reviewed and approved the SLOs before the final approval by the Faculty Board. The developed SLOs were shared and discussed with all teaching staff in the school through a School Board meeting. This consultative process ensured that the SLOs were not only academically rigorous but also aligned with industry expectations and Engineers Australia Stage 1 Competency Standards.

On successful completion of this specialisation, graduates will be able to:

- SL01.** Demonstrate a rigorous understanding of the fundamental principles embodied in Electrical Engineering.
- SL02.** Identify, select, and apply specialist in-depth technical knowledge and current research, in electrical energy systems, electronics, control systems, signal processing and communications technology.
- SL03.** Think independently, critically, logically and apply analytical procedures and tools to develop complex hardware and software electrical systems.
- SL04.** Proficiently apply problem-solving and design skills to demanding, open-ended electrical design challenges.
- SL05.** Demonstrate a professional attitude concerning the role of engineers in society and a well-developed, responsible ethic including safety and environmental concerns.
- SL06.** Communicate technical and non-technical concepts fluently and effectively to all audiences, whether as part of a project team or in a leadership context.

The knowledge base developed in SL01 directly supports the Stage 1 competency requirement for a sound and comprehensive grasp of underpinning engineering sciences. SL02 ensures graduates can apply advanced technical knowledge to practical engineering problems, meeting the competency in engineering application ability. The analytical and problem-solving skills in SL03 reflect professional trends towards innovation and adaptability in modern engineering practice. SL04 demonstrates attainment of competencies in creativity, design innovation, and the ability to manage complex projects. The professional attitude and ethical responsibility highlighted in SL05 align with industry and community needs for socially responsible engineers committed to sustainable practice. Finally, SL06 ensures graduates meet the competencies in professional and personal attributes, becoming effective communicators and collaborators in multidisciplinary environments.

## 4. Continuous Improvement

The School of Electrical Engineering and Telecommunications (EE&T) has embedded a culture of continuous improvement into the design and delivery of the Electrical Engineering specialisation. Program quality is assured through systematic evaluation of teaching practices, assessment integrity, industry feedback, and alignment with Engineers Australia (EA) Stage 1 Competency Standards.

Academic integrity is safeguarded through robust assessment processes, which are explained in detail in Section 7. To ensure academic integrity, all final exam papers are reviewed by another academic with relevant technical knowledge and then a final review of the papers is done by the Director of Academic Studies. Thesis reports are submitted using Turnitin for checking against plagiarism, and they are blind marked by two academics to ensure consistency. A third assessor is utilised if there is a discrepancy larger than ten marks. For online written exams, various approaches have been adopted such as personalised exam papers or having a number of different versions. Some courses include an oral assessment as a compulsory component to pass the course. The markers are trained to identify plagiarism in the exams/reports and if anything identified, these are referred to the School Student Integrity Advisor, who meets with students before finalising an outcome. Plagiarism cases found are recorded in the university Plagiarism Register or Misconduct Register, the latter for serious cases. These measures demonstrate the School's commitment to continuous quality assurance and integrity in assessment practices, ensuring alignment with professional standards and community expectations.

Curriculum evaluation extends beyond coursework to include industrial engagement. The 60-day Industrial Training amounts to 480 hours in total as compared to the standard study load of 150 hours for a course. Thus, it is equivalent to 3 courses targeting mainly on EA's competencies 2 and 3, resulting in a more balanced overall curriculum alignment. The heatmap (Figure 4) provides a high-level, strategic view of the specialisation that will inform all future course and specialisation revisions. This systematic

evaluation process ensures that program design remains responsive to industry needs, accreditation requirements, and future workforce demand.

Practical learning remains a cornerstone of the program. Laboratory work, which takes place every week in every technical course, accounts for a significant proportion of contact hours, ensuring students gain hands-on experience with real systems. In response to the post-pandemic shift toward online delivery, the School has invested in developing remote laboratory infrastructure, enabling students to access and control equipment through web-enabled interfaces. This award-winning innovation ensures that practical learning remains accessible and relevant, even in flexible delivery modes. It has been highly appreciated by students during covid as well as post-pandemic. The School already has a dedicated Learning and Teaching Innovation Laboratory and the aim will be to continue supplying it with the latest technologies for experimentation.

Continuous improvement is also driven by industry and community needs. Feedback from the Industry Advisory Board informs curriculum updates, ensuring graduates are prepared for evolving demands in areas such as renewable energy, digital communications, automation, and biomedical technologies. In this AI era, the program is regularly benchmarked against international standards and professional trends, ensuring that graduates remain competitive in global engineering markets.

Through these mechanisms, the Electrical Engineering specialisation maintains a dynamic and responsive curriculum. Ongoing evaluation of assessment integrity, industry engagement, and technological innovation ensures that graduates are not only aligned with Engineers Australia Stage 1 competencies but also prepared to meet the challenges of future engineering practice.

## **5. Review Process**

UNSW's Academic Offering Review and Monitoring Procedure outlines a structured approach to maintaining the quality and relevance of academic programs and courses. It includes both program-level and course-level review processes, with defined responsibilities and timelines.

Program Monitoring is conducted annually for all programs and specialisations. A comprehensive program review must occur at least once every five years for accredited programs, and every seven years for others. These reviews include a self-evaluation report (SER), review panel, review event, and a formal response with an implementation plan. Oversight is provided by the Academic Board and University Academic Quality Committee (UAQC), with input from Faculty Education Committees and Deans.

Course Review within UNSW Engineering is managed through a two-tiered process: Routine Course Review and Comprehensive Course Review. Routine reviews are conducted at the end of each term by Schools, using data such as enrolment, assessment outcomes, academic integrity issues, WAM differences, and student feedback (myExperience). Courses flagged through this process are added to the Comprehensive Course Review roster.

Comprehensive Course Reviews are detailed evaluations led by the Course Convenor in collaboration with a Faculty Educational Developer, Nexus Fellow, or Senior Academic. These reviews assess course design, pedagogy, alignment with learning outcomes, and feedback mechanisms. Outcomes are documented in a Course Development Plan and an Evaluation Report following the next course delivery. Schools must review at least 10% of their courses annually.

Stakeholder involvement spans multiple levels, including the Academic Board, UAQC, Faculty and School committees, Course Convenors, and external contributors such as students and professional bodies.

Frequency of updates includes termly course reviews, annual program monitoring, and five-yearly comprehensive reviews for accredited programs.

## 6. Curriculum Mapping

Curriculum mapping for the Electrical Engineering specialisation (ELECAH3707) of the 3707 Bachelor of Engineering (Honours) program started at the course level and progressed to the specialisation level.

At the course level, the course coordinators develop their course outlines (COs) to articulate the course's context and relevance within the program. Each CO includes details about the course learning outcomes (CLOs) which lists the knowledge, attributes, skills, and practices that students are expected to acquire and demonstrate after completing that course. Each CO also specifies the various assessments (exam, quiz, lab work, assignment, etc) and their alignment to validate attainment of the CLOs. UNSW Assessment Policy prescribes that each course can have up to four main assessment components of varying weightings, and each component may comprise several subcomponents. The assessment weightings and the mapping of the assessments to the CLOs are developed by the course coordinators and provided in the COs for transparency in the course design and assessment. Enterprise Course Outline System (ECOS) developed by UNSW is used for generating the COs so that CLOs, assessments, and other key course information can be easily located, linked to the educational platform such as MOODLE. This ensures a consistent format across all the UNSW courses including this specialisation.

The mapping of the CLOs to the different assessment types in all the core and elective courses in the ELECAH3707 specialisation has been compiled. To illustrate this, Fig. 1 shows a screenshot of some courses.

At the specialisation level, the curriculum mapping was conducted in two stages.

Each CLO in a course is mapped to the SLOs with either *introduced*, *developed*, or *proficient* attainment levels. The CLO-SLO mappings for the courses were completed by the course convenors. The mappings were subsequently reviewed by the School education team. Fig. 2 shows screenshot of the completed CLO-SLO mapping for some example courses.

Table 1. Mapping of SLOs to PLOs (Engineers Australia Stage 1 Competency elements)

SLO/PLO	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PLO13	PLO14	PLO15	PLO16
1. Demonstrate a rigorous understanding of the fundamental principles embodied in Electrical Engineering.	x	x				x					x					
2. Identify, select, and apply specialist in-depth technical knowledge and current research, in electrical energy systems, electronics, control systems, signal processing and communication technology.			x	x	x		x		x							
3. Think independently, critically, logically and apply analytical procedures and tools to develop complex hardware and software electrical systems.					x		x	x	x	x						
4. Proficiently apply problem-solving and design skills to demanding, open-ended electrical design challenges.					x		x	x	x	x			x			
5. Demonstrate a professional attitude concerning the role of engineers in society and a well-developed, responsible ethic including safety and environmental concerns.						x				x	x	x	x	x	x	
6. Communicate technical and non-technical concepts fluently and effectively to all audiences, whether as part of a project team or in a leadership context.												x	x	x	x	x

NOTE: <sup>PLO1</sup>Comprehensive theory-based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering; <sup>PLO2</sup> Conceptual understanding of the mathematics, numerical analysis, statistics and computer and information sciences which underpin the engineering discipline; <sup>PLO3</sup> In-depth understanding of specialist bodies of knowledge within the engineering discipline; <sup>PLO4</sup> Discernment of knowledge development and research directions within the engineering discipline; <sup>PLO5</sup> Knowledge of engineering design practice and contextual factors impacting the engineering discipline; <sup>PLO6</sup> Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice; <sup>PLO7</sup>Application of established engineering methods to complex engineering problem solving; <sup>PLO8</sup>Fluent application of engineering techniques, tools and resources; <sup>PLO9</sup>Application of systematic engineering synthesis and design processes; <sup>PLO10</sup> Application of systematic approaches to the conduct and management of engineering projects; <sup>PLO11</sup> Ethical conduct and professional accountability; <sup>PLO12</sup> Effective oral and written communication in professional and lay domains; <sup>PLO13</sup> Creative, innovative and pro-active demeanour; <sup>PLO14</sup> Professional use and management of information; <sup>PLO15</sup> Orderly management of self and professional conduct; <sup>PLO16</sup> Effective team membership and team leadership.

Table 2. Screenshot of the completed CLO-SLO mapping.

Course code	1. Demonstrate a rigorous understanding of the fundamental principles embodied in Electrical Engineering.	2. Identify, select, and apply specialist in-depth technical knowledge and current research, in electrical energy systems, electronics, control systems, signal processing and communication technology.	3. Think independently, critically, logically and apply analytical procedures and tools to develop complex hardware and software electrical systems.	4. Proficiently apply problem-solving and design skills to demanding, open-ended electrical design challenges.	5. Demonstrate a professional attitude concerning the role of engineers in society and a well-developed, responsible ethic including safety and environmental concerns.	6. Communicate technical and non-technical concepts fluently and effectively to all audiences, whether as part of a project team or in a leadership context.
Level 1 Core Courses						
COMP1511	Introduced					
COMP1521	Introduced					
COMP1911	Developed					
DESN1000	Introduced	Introduced	Developed	Developed	Developed	Developed
ELEC1111	Introduced	Introduced	Introduced	Introduced	Introduced	Introduced
MATH1131	Developed		Introduced			Introduced
MATH1141	Developed		Introduced			Introduced
MATH1231	Developed		Introduced			Introduced
MATH1241	Developed		Introduced			Introduced
PHYS1121	Introduced					
PHYS1131	Introduced					
PHYS1231	Introduced					
Level 2 Core Courses						
DESN2000	Developed	Developed	Introduced	Introduced	Introduced	Developed
ELEC2133	Developed	Developed	Developed	Introduced	Introduced	Introduced
ELEC2134	Developed	Developed	Developed	Introduced		Introduced
ELEC2141	Proficient	Proficient				
MATH2069	Developed					
MATH2099	Developed					
Level 3 Core Courses						
ELEC3104	Developed	Developed	Developed	Developed		Proficient
ELEC3105	Developed	Developed	Developed	Introduced	Introduced	Introduced



ELEC3106	Proficient	Developed	Developed	Developed		Developed
ELEC3114	Proficient	Developed	Developed			Developed
ELEC3115	Developed	Developed	Introduced	Introduced	Introduced	Introduced
ELEC3117	Proficient	Proficient	Proficient	Developed	Proficient	Proficient
TELE3113	Proficient	Developed	Developed	Developed		Introduced
Level 4 Core Courses						
ELEC4122					Proficient	Proficient
ELEC4123	Proficient	Developed	Proficient	Proficient	Developed	Proficient
ELEC4951		Proficient	Proficient	Proficient	Proficient	Proficient
ELEC4952		Proficient	Proficient	Proficient	Proficient	Proficient
ELEC4953		Proficient	Proficient	Proficient	Proficient	Proficient
Breadth Electives						
COMP2041	Developed					Developed
COMP3211	Proficient		Developed			Developed
COMP3231	Proficient					
ELEC3111	Introduced	Introduced	Introduced	Introduced	Introduced	
ELEC3145	Developed	Introduced	Developed	Developed		Introduced
ELEC3146	Developed	Developed	Developed	Developed		
ELEC3705	Developed	Developed	Developed			
ENGG2600		Introduced	Introduced	Introduced	Introduced	Introduced
ENGG3001	Introduced	Introduced	Introduced		Developed	Developed
ENGG3060	Introduced	Introduced	Introduced	Developed	Developed	Developed
ENGG3600		Developed	Developed	Developed	Developed	Developed
ENGG3741	Introduced	Introduced	Introduced			Developed
ENGG4060			Developed	Developed	Developed	Developed
ENGG4102		Developed	Developed	Developed	Developed	Developed
ENGG4600		Proficient	Proficient	Proficient	Proficient	Proficient
MATH3101	Proficient					
MATH3121	Proficient					Developed
MATH3161	Proficient		Developed			Developed
MATH3201	Proficient					Developed
MATH3261	Proficient					Developed



MATH3411	Developed					
TELE3118	Proficient	Developed	Proficient	Proficient	Developed	Developed
TELE3119	Proficient	Developed	Proficient	Proficient	Introduced	Proficient
Discipline Electives						
ELEC4445					Proficient	Developed
ELEC4601	Proficient	Proficient	Proficient	Developed	Developed	Developed
ELEC4602	Proficient	Proficient	Proficient	Proficient		Proficient
ELEC4603	Proficient	Proficient	Proficient	Introduced	Developed	Developed
ELEC4605	Proficient	Proficient	Proficient	Proficient		Developed
ELEC4611	Proficient	Developed	Developed	Developed	Introduced	Developed
ELEC4612	Proficient	Introduced	Proficient	Introduced	Developed	Developed
ELEC4613	Developed	Introduced	Developed	Developed	Introduced	Developed
ELEC4614	Introduced	Proficient	Proficient	Developed	Introduced	Introduced
ELEC4617	Proficient	Proficient	Proficient	Proficient	Introduced	
ELEC4621	Proficient	Proficient	Proficient	Proficient	Developed	Proficient
ELEC4622	Proficient	Proficient	Developed	Developed		Introduced
ELEC4623	Proficient	Proficient	Proficient	Proficient	Developed	
ELEC4631	Proficient	Developed	Developed	Developed	Developed	Developed
ELEC4632	Proficient	Developed	Developed	Developed	Introduced	Introduced
ELEC4633						
PHTN4661	Developed	Developed	Introduced	Introduced		Introduced
PHTN4662	Developed	Developed	Developed	Introduced		Developed
TELE4642	Proficient	Proficient	Proficient	Proficient	Developed	Developed
TELE4651	Developed	Proficient	Developed	Developed	Developed	Proficient
TELE4652	Developed	Proficient	Proficient	Proficient	Developed	Developed
TELE4653	Proficient	Proficient	Developed	Developed	Developed	Proficient



## 7. Assessments

### 7.1. Assessment types used within the specialisation

The mixture of assessment types used within the specialisation is shown below in Figs. 1-3.

As is typical of many specialisations, early courses are content-driven and the assessments reflect a desire to see demonstration of individual learning in tests or examinations. Students commonly have opportunities for longer-form formative or summative assignment activities. In later years, the assessment mix tends to pivot towards project work, often in teams.

It is noted in many courses, terms such as assignment, essay, report, and project are often used interchangeably. Similarly, exam and test, as well as presentation and performance, may refer to comparable forms of assessment. For example, a presentation based on a project might be categorized either as a project or as a presentation. Laboratory work may also be evaluated through reports, interviews, or presentations, and therefore may not always be explicitly labelled as “Laboratory”.

### ELECTRICAL ENGINEERING

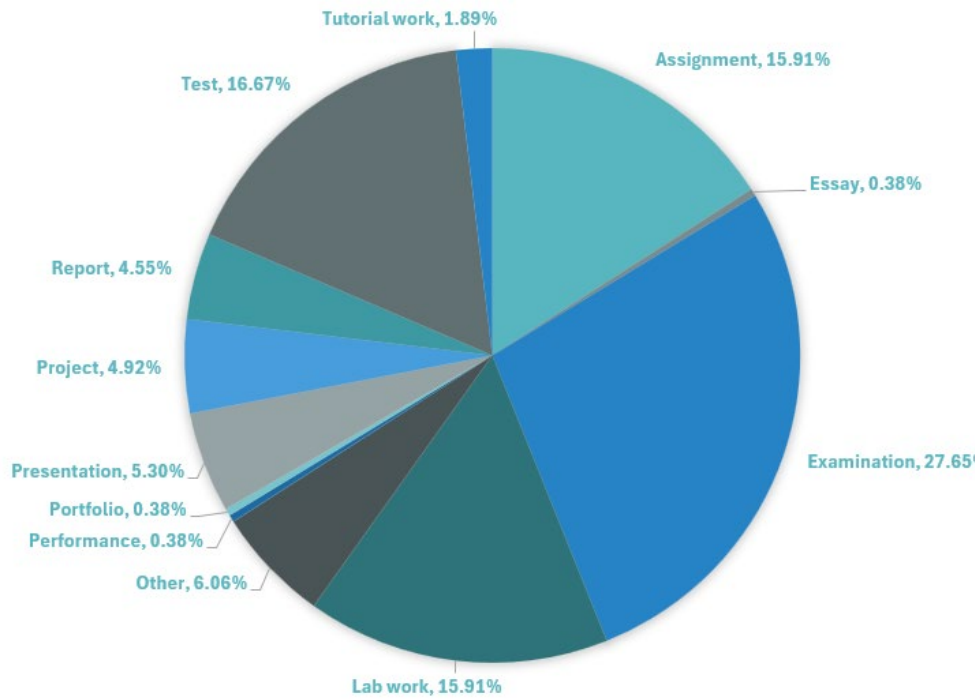


Fig. 1: Percentage of assessment types used within the specialisation.

### ELECTRICAL ENGINEERING CORE

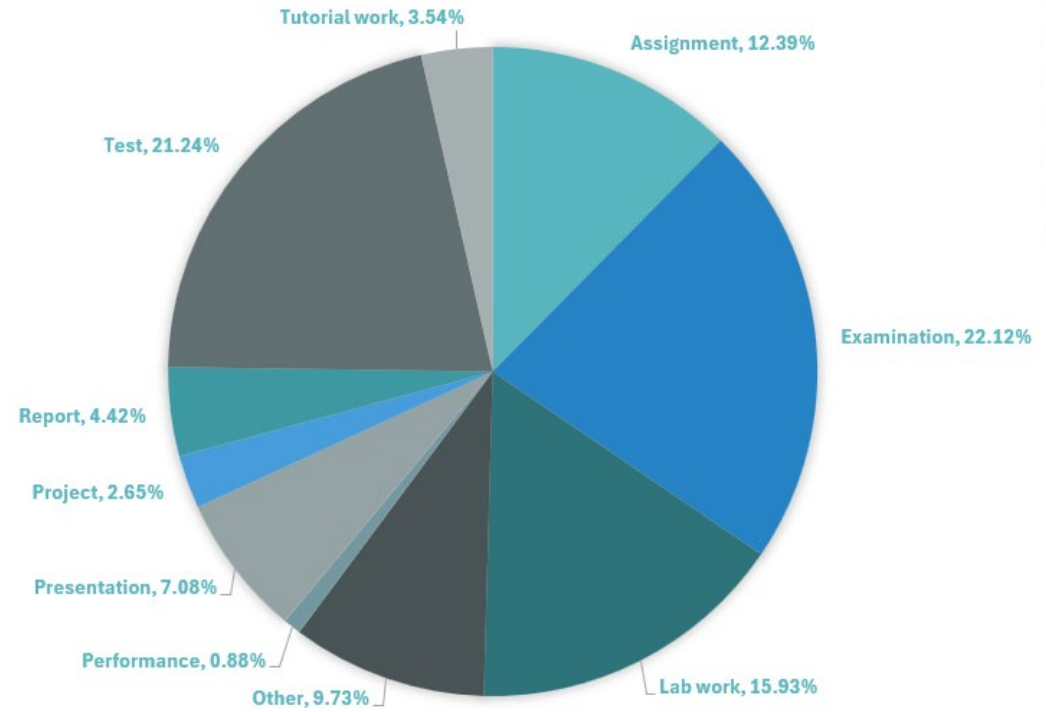


Fig. 2: Percentage of assessment types used within the core of the specialisation.

### ELECTRICAL ENGINEERING ELECTIVES

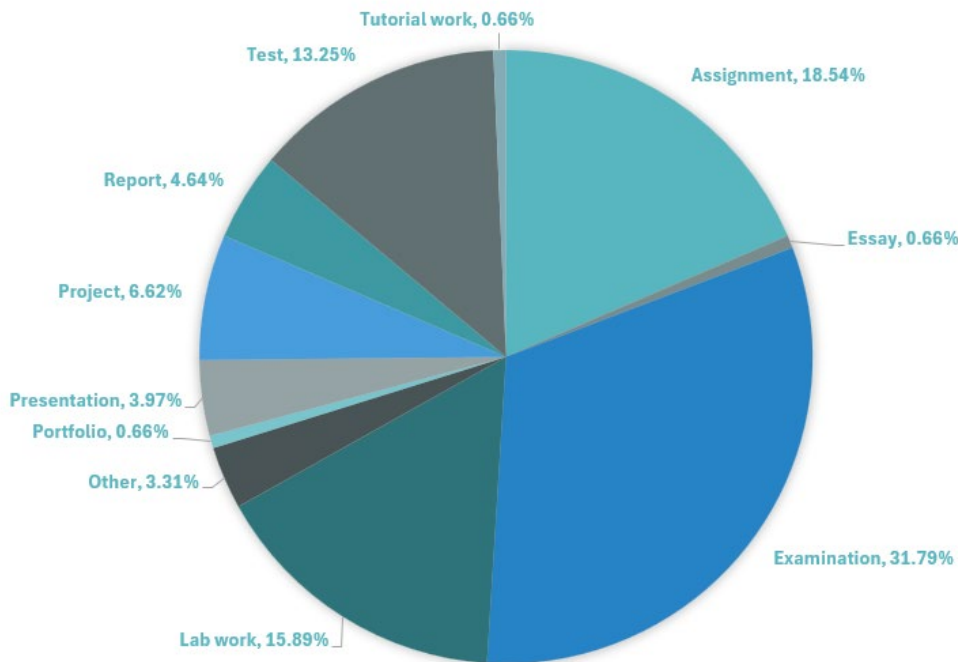


Fig. 3. Percentage of assessment types used within the electives of the specialisation.

## 7.2. Alignment of assessment and grading with learning outcomes and graduate capabilities

The School of EE&T employs a comprehensive and integrated assessment strategy to ensure that students achieve the intended learning outcomes at the course level and demonstrate the graduate capabilities required by Engineers Australia. This strategy is underpinned by deliberate alignment between course-level learning outcomes (CLOs), assessment tasks, and program-level learning outcomes (PLOs), ensuring a coherent and cumulative learning experience across the program.

Assessment tasks within each course are designed to directly target specific CLOs. These tasks span a diverse range of formats—including laboratory work, design projects, programming assignments, oral presentations, quizzes, and examinations—to capture the breadth of skills and knowledge expected of engineering graduates. The variety ensures that students are assessed not only on their theoretical understanding but also on their ability to apply concepts in practical, real-world contexts.

In order to ensure the alignment between CLOs and assessment, every course outline includes an explicit mapping of CLOs to assessment tasks. This mapping ensures that all CLOs are assessed through one or more appropriately designed tasks, providing multiple opportunities for students to demonstrate their competence. This alignment is documented and made transparent to students, reinforcing the purpose of each assessment and how it contributes to their overall development. It also enables academic staff to systematically monitor and ensure comprehensive coverage of learning outcomes across the curriculum.

To support consistency and fairness in evaluation, each assessment task is accompanied by a detailed grading schema or rubric. These rubrics articulate clear performance criteria aligned with UNSW's academic standards and/or Engineers Australia's Stage 1 Competency Standards. Students are

provided with these rubrics in advance, promoting transparency and helping them understand the expectations for success. Moderation processes—including peer review of assessment instruments, calibration of marking, and analysis of grade distributions—are routinely implemented to ensure reliability and equity across different offerings and delivery modes.

Graduate capability validation is achieved through the aggregation of assessment data across the program. Capstone design projects, industry placements, and integrative courses such as ELEC4123 – Electrical Design Proficiency serve as critical points where students demonstrate the synthesis of knowledge, problem-solving, communication, teamwork, and ethical practice. These experiences are mapped to program-level learning outcomes, which in turn align with Engineers Australia’s graduate attributes. Evidence of student attainment is collected through embedded assessments and reflective activities and is reviewed as part of the School’s ongoing quality assurance and curriculum review processes.

This continuous improvement framework is supported by regular stakeholder engagement—including feedback from students, industry partners, and alumni—as well as benchmarking against national and international standards. These inputs inform the refinement of assessment strategies, ensuring that they remain aligned with evolving professional expectations and continue to support the development of capable, work-ready graduates.

### **7.3. Reflective practice and standards-based self-assessment**

In terms of reflective practice and self-assessment processes, these are embedded throughout the program to support students in tracking their progressive attainment of graduate capabilities. These processes are explicitly referenced to relevant standards and benchmarks, including Engineers Australia’s Stage 1 Competency Standard and UNSW’s program-level learning outcomes, ensuring that students develop a clear understanding of their growth and readiness for professional practice.

Reflective activities are integrated into multiple courses across the program, particularly in design projects and laboratory work. Students are encouraged to critically evaluate their own performance, identify areas for improvement, and articulate how their learning aligns with the expected graduate capabilities. These reflections often take the form of structured journals, post-assessment reviews, peer evaluations, and guided prompts that link personal development to specific learning outcomes.

Self-assessment is further supported by rubrics and capability frameworks that are shared with students at the beginning of each course. These tools allow students to benchmark their progress against defined performance criteria and graduate attributes. In some courses, students complete self-marking exercises at key milestones, comparing their perceived competence with instructor feedback – this is the case for the self-marking task performed for the mid-term examination in the early year courses ELEC1111 – Electrical Circuit Fundamentals and ELEC2134 – Circuits and Signals. This triangulated approach fosters metacognitive awareness and empowers students to take ownership of their learning journey.

Capstone courses and industry-linked experiences provide additional opportunities for reflective practice. Students are required to submit reflective reports that explicitly address how their project work demonstrates attainment of Engineers Australia’s competencies, including problem-solving, communication, teamwork, and ethical responsibility. These reflections are assessed not only for content but also for the student’s ability to critically engage with professional standards and articulate their readiness for graduate practice.

These reflective and self-assessment practices are reviewed regularly as part of the School’s quality assurance processes. Feedback from students, academic staff, and industry stakeholders informs the continuous enhancement of these mechanisms to ensure they remain meaningful, standards-aligned, and effective in preparing students for professional engineering roles.

## 7.4. Approaches to the use of generative AI and assessment integrity

The program recognises the growing influence of generative AI tools in engineering education and practice. Assessment tasks are structured to minimise risks of academic misconduct while encouraging authentic engagement. Strategies include:

- Emphasis on problem solving, design justification, and reflective commentary that require individual reasoning beyond AI outputs.
- Use of oral presentations, in class demonstrations, and iterative submissions to verify student ownership of work.
- Clear marking rubrics that reward critical review of AI-assisted content rather than passive reproduction.

By embedding reflection on AI use within assessment, students develop awareness of ethical responsibilities, intellectual property considerations, and professional accountability. This approach also ensures that while students gain familiarity with emerging technologies, assessment integrity is preserved, and graduate capabilities in critical thinking, reflective practice, and ethical judgment are strengthened.

Some specific examples of how students are instructed to use generative AI are as follows: In some courses, such as ELEC3117 – Electrical Engineering Design, generative AI may be used for drafting or coding support, but all use must be explicitly acknowledged. Integrity is safeguarded through oral presentations, lab demonstrations, and iterative submissions that confirm student ownership of work. In other courses, such as ELEC4122 – Strategic Leadership and Ethics, AI can assist with background research or brainstorming, but students must critically reflect on its reliability and ethical implications. This ensures independent judgment and alignment with professional responsibility standards.

## 8. Specialisation Progression Plan

### *Years 1–2: Building Foundations for Independent Learning*

In the early years, students engage with structured learning environments that introduce core engineering principles while encouraging self-directed inquiry. For example, ELEC1111 – Electrical Circuit Fundamentals introduces students to reflective learning through structured feedback during laboratory evaluations and self-marking of the mid-term exam. This course begins the transition from guided instruction to independent exploration. Progression plans at this stage emphasise the acquisition of core knowledge and the initial development of reflective practice, enabling students to track their movement from guided learning to independent inquiry.

### *Years 2–3: Developing Critical Review and Reflective Practice*

As students progress, the curriculum emphasises deeper engagement with complex engineering problems and critical evaluation. Examples of key courses include:

- ELEC2134 – Circuits and Signals, which fosters critical review and reflective practice by requiring students to analyse and compare circuit models, evaluate simulation results against theory, and reflect on laboratory outcomes to identify errors and improvements. Through iterative problem solving, feedback, and progressive learning, the course develops students' ability to critically assess their own work and learning trajectory.
- ELEC3104 – Digital Signal Processing is structured around the Tiered Learning Framework (TLF), a student-driven learning framework for course and assessment design. The TLF divides the learning curve within a course into five levels, encourages students to think about which level they are currently at with their learning, and guides them on what they need to do to progress to the next level. Within this proposed framework, students have more control and choice over how much they

want to learn and deepen their knowledge. All elements of the course including problem sheets, assessments, labs, project and final exam are structured as per the tiered framework and students find a greater sense of connection and achievement in assessing their depth of study and choosing their learning level. As a result, they are better equipped to manage their time and have the satisfaction of achieving their self-set goals.

- ELEC3117 – Electrical Engineering Design provides a capstone experience that explicitly develops students’ capacity for critical review and reflective practice. Through team-based design projects, students evaluate alternative technical solutions against performance, cost, safety, and sustainability criteria, while reflecting on their own contributions and professional responsibilities. Iterative design cycles, structured feedback, and engagement with industry standards require students to critically assess decisions and refine approaches, thereby strengthening judgment and self-assessment.

These experiences enhance students’ ability to critically assess their own work and that of peers, while refining their technical judgment. Progression plans during this stage highlight the transition from foundational knowledge to advanced analytical and design capabilities, ensuring students can see and document their growth in problem-solving and reflective practice.

#### *Year 4: Capstone and Professional Autonomy*

The final year focuses on synthesizing technical knowledge with independent project execution. Examples of key courses include:

- ELEC4123 – Electrical Design Proficiency represents a pivotal capstone experience in the program, where students transition from structured coursework into independent, professionally oriented practice in the area of electrical engineering. The course requires students to integrate knowledge to deliver design projects on different disciplines, exercising autonomy in problem definition, solution development, and project management. By engaging with open-ended, industry relevant challenges, students critically evaluate technical options, reflect on their decision-making processes, and assume responsibility for outcomes. This progression into capstone work fosters professional judgment, self-assessment, and autonomy.
- ELEC4951/ELEC4952/ELEC4953– Thesis A/B/C require students to undertake substantial individual research or design projects. These include:
  - Independent planning and execution of engineering investigations.
  - Critical literature review and synthesis of current research.
  - Formal self-assessment and reflection on project outcomes.
  - Peer feedback during oral presentations and poster sessions.
- ELEC4122 – Strategic Leadership & Ethics, develops students’ capacity for professional autonomy by engaging them with the ethical, managerial, and strategic dimensions of engineering practice. The course requires students to critically review case studies, reflect on leadership approaches, and evaluate the ethical implications of engineering decisions in complex organisational contexts, reinforcing professional responsibility.

These culminating experiences demonstrate students’ capacity for autonomous learning, critical review, and professional self-awareness. Progression plans in the final year serve as a comprehensive record of graduate capability development, integrating evidence from capstone projects, thesis work, and leadership courses. This ensures that students, staff, and accrediting bodies can clearly track the trajectory of professional growth across the program, confirming readiness for Engineers Australia Stage 1 Competency Standard.

Students can track their progression through the “myPlan” checker tool.

[myPlan | Current Students - UNSW Sydney](#)

A progression checklist and/or study plan is also available for students for the single degree and the double degree offerings.

[Progression checksheets & study plans | Engineering - UNSW Sydney](#)