UNSW SYDNEY

UNSW Engineering

Education Specification

1. Program Overview

Program Title: Engineering (Honours) / Engineering

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

Engineering Discipline: Electrical Engineering

The Bachelor of Engineering (Honours) / Master of Engineering in Electrical Engineering (Program Code: 3736, Plan Code: ELECBH3736) is a five-year full-time integrated program requiring the completion of 240 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, while also completing a compulsory 24 UoC minor in a discipline outside electrical engineering.

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 power systems, electronics, communications, signal processing, and control.
- *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) / Master of Engineering (Electrical Engineering)* reflects both the academic depth and professional orientation of the program:

- *Bachelor of Engineering (Honours) / Master of Engineering* indicates a five-year integrated program that combines undergraduate and postgraduate study, culminating in both an Honours thesis and advanced Master-level coursework and project.
- *Electrical Engineering* specifies the discipline focus, highlighting the program's emphasis on the generation, transmission, and application of electrical energy, as well as modern telecommunications and signal processing.

2. Career Alignment

2.1. Alignment with Industry Sectors and Workforce Needs

Courses within the program 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. These are 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. These areas are 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. Such sectors are in high demand 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

The program 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. These enable 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. Such skills are 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

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.

The BEME in Electrical Engineering combines the Bachelor of Engineering (Honours) in Electrical Engineering (ELECAH3707) and the Master of Engineering in Electrical Engineering (ELECAS8621). Thus, its specialisation framework is the integration of the SLOs from ELECAH3707 and ELECAS8621. On successful completion of this specialisation, graduates will be able to: (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; (7) Integrate advanced Master-level coursework and research skills to address complex engineering problems, demonstrating depth of expertise beyond the undergraduate level; and (8) Apply interdisciplinary knowledge through the compulsory minor in a non-electrical engineering discipline, ensuring breadth of capability and adaptability in diverse professional contexts.

In the above, the knowledge base developed in (1) directly supports the Stage 1 competency requirement for a sound and comprehensive grasp of underpinning engineering sciences. (2) 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 (3) reflect professional trends towards innovation and adaptability in modern engineering practice. (4) demonstrates attainment of competencies in creativity, design innovation, and the ability to manage complex projects. The professional attitude and ethical responsibility highlighted in (5) align with industry and community needs for socially responsible engineers committed to sustainable practice. Finally, (6) ensures graduates meet the competencies in professional and personal attributes, becoming effective communicators and collaborators in multidisciplinary environments. (7)&(8) extend these competencies by embedding postgraduate-level depth and interdisciplinary breadth, aligning the program with AQF Level 9 expectations and international benchmarks for integrated engineering qualifications.

The BEME in Electrical Engineering is a program by itself, i.e., no other specialisations. The Specialisation Learning Outcomes (SLOs) are synonymous with the Program Learning Outcomes (PLOs), and they are the 16 Engineers Australia Stage 1 Competency elements:

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

PLO16. Effective team membership and team leadership.

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 Bachelor of Engineering (Honours) / Master of Engineering (Electrical Engineering) program. 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. 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 BEME Electrical Engineering program 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

5.1. Faculty-led Review

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 3736 Engineering (Honours) specialisation of combined Bachelor (Honours) and Master of Engineering program started at the course level and progressed to the program level as this is the only specialisation under the 3736 program.

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.

At the specialisation (program) level, the curriculum mapping was conducted using an Excel-based mapping tool—developed specifically for mapping the CLOs of all core and elective courses in the 3736 Engineering (Honors) program to the 16 PLOs (which are 16 Engineers Australia Stage 1 Competency elements. This tool allows each CLO in a course to be mapped to the 16 PLOs with either introduced, developed, or proficient attainment levels. The CLO-PLO mappings for the courses were completed by the course convenors. The mappings were subsequently reviewed by the School educational team consisting of Deputy Head of School Education, Director of UG Academic studies, Director of PG Academic studies, and Deputy Director of PG Academic Studies. Fig. 1 shows screenshot of the completed CLO–SLO mapping for some example courses

Course code	CLO *only empty cells are editable	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PLO13	PLO14	PLO15	PLO16
Level 1	Level 1 Core Courses - 48 credit points																
ELEC2117	CLO3 Communicate details of their design and challenges faced with implementation.	Developed	Developed	Introduced		Developed	Introduced			Introduced		Introduced	Introduced	Introduced	Introduced	Introduced	
Level 3	Level 3 Core Courses - 30 credit points																
ELEC3104	ELEC3104 Digital Signal Processing	**Developed**	**Developed**	**Developed**		**Developed**	**Introduced**	**Developed**	**Developed**	**Introduced**	**Introduced**	**Introduced**	**Introduced**				
ELEC3104	CLO1 Analyse linear time-invariant systems	Developed	Developed	Developed		Developed	Introduced	Introduced	Introduced	Introduced	Introduced						
ELEC3104	CLO2 Demonstrate competency in time and frequency domain analysis of signals and systems	Developed	Developed	Developed		Developed	Introduced	Introduced	Developed	Introduced	Introduced						
ELEC3104	CLO3 Design and analyse digital filters for a given specification	Developed	Developed	Developed		Developed	Introduced	Developed	Developed	Introduced	Introduced	Introduced	Introduced				
ELEC3104	CLO4 Implement a simple multi-rate system	Introduced	Introduced	Introduced		Introduced	Introduced	Introduced	Introduced	Introduced	Introduced	Introduced	Introduced				
ELEC3105	ELEC3105 Electrical Energy	**Developed**	**Developed**	**Introduced**	**Introduced**	**Introduced**	**Introduced**	**Developed**	**Introduced**					**Introduced**	**Introduced**	**Introduced**	
ELEC3105	CLO1 Analyse single and three phase AC circuits	Developed	Developed	Introduced	Introduced	Introduced	Introduced	Developed	Introduced					Introduced	Introduced	Introduced	
ELEC3105	CLO2 Explain the working principle including the steady-state performances of important powe	Developed	Developed	Introduced	Introduced	Introduced	Introduced	Developed	Introduced					Introduced	Introduced	Introduced	
ELEC3105	CLO3 Implement specifications for transformers, DC machines, induction machines and synch	Developed	Developed	Introduced	Introduced	Introduced	Introduced	Developed	Introduced					Introduced	Introduced	Introduced	
ELEC3105	CLO4 Gain practical experience in the performance and operation of these important power eng	Developed	Developed	Introduced	Introduced	Introduced	Introduced	Developed	Introduced					Introduced	Introduced	Introduced	
ELEC3114	ELEC3114 Control Systems	**Mastered**	**Mastered**	**Developed**		**Developed**		**Developed**	**Developed**	**Developed**			**Developed**		**Developed**	**Developed**	
ELEC3114	CLO1 Identify an approximate linear/linearized model for a physical dynamic system.	Developed	Developed	Introduced		Introduced		Developed	Introduced	Introduced			Developed		Developed	Developed	
ELEC3114	CLO2 Analyse linear time-invariant (LTI) systems in both time domain and frequency domain	Mastered	Mastered	Developed		Introduced		Developed	Developed	Introduced			Developed		Developed	Developed	
ELEC3114	CLO3 Explain the concept of control systems stability and feedback control systems.	Developed	Mastered	Developed		Introduced		Developed	Developed	Introduced			Developed		Developed	Developed	
ELEC3114	CLO4 Apply time-domain and frequency-domain techniques to analytically design linear contro	Developed	Mastered	Developed		Developed		Developed	Developed	Developed			Developed		Developed	Developed	
ELEC3114	CLO5 Apply control systems theories through hands-on and in-depth experience in laboratory.	Developed	Developed	Developed		Developed		Developed	Developed	Developed			Developed		Developed	Developed	
ELEC3114	CLO6 Utilize software tools to help with analysis, design, evaluation, and implementation of cor	Developed	Developed	Developed		Introduced		Developed	Introduced	Developed			Developed		Developed	Developed	
ELEC3115	ELEC3115 Electromagnetic Engineering	**Developed**	**Mastered**	**Introduced**	**Introduced**	**Developed**	**Introduced**	**Developed**	**Developed**				**Developed**		**Developed**	**Developed**	**Developed**
ELEC3115	CLO1 Use Gauss', Ampere's and Faraday's Laws in the context of design and apply them in the e	Developed	Mastered	Introduced	Introduced	Developed	Introduced	Developed	Developed				Developed		Developed	Developed	Developed
ELEC3115	CLO2 Analyse characteristics of capacitor and inductor by evaluating the impact of dielectric an	Developed	Developed	Introduced	Introduced	Developed	Introduced	Developed	Developed				Developed		Developed	Developed	Developed
ELEC3115	CLO3 Solve simple boundary value problems, using the method of images, Poisson's and Lapla	Introduced	Introduced	Introduced	Introduced	Introduced	Introduced	Developed	Developed				Developed		Developed	Developed	Developed
ELEC3115	CLO4 Identify the conditions that make the lumped-element models of electrical circuits break	Introduced	Introduced	Introduced	Introduced	Introduced	Introduced	Developed	Developed				Developed		Developed	Developed	
ELEC3115	CLO5 Calculate the effect of reflections in transmission lines at HF, and apply analytical and gra	Introduced	Introduced	Introduced	Introduced	Introduced	Introduced	Developed	Developed				Developed		Developed	Developed	
ELEC3115	CLO6 Describe and apply the fundamental properties of propagation modes in waveguides	Introduced	Introduced	Introduced	Introduced	Introduced	Introduced	Developed	Developed				Developed		Developed	Developed	
ELEC3117	ELEC3117 Electrical Engineering Design	**Mastered**	**Mastered**	**Developed**		**Mastered**	**Introduced**	**Mastered**	**Developed**	**Developed**	**Introduced**	**Introduced**	**Mastered**	**Developed**	**Mastered**	**Mastered**	**Mastered**
ELEC3117	CLO1 Demonstrate a systematic approach including initiating, designing and managing an elec	Mastered	Mastered	Developed		Mastered	Introduced	Mastered	Developed	Developed	Introduced	Introduced	Developed	Developed	Mastered	Mastered	Mastered
ELEC3117	CLO2 Demonstrate software skills with project management, circuit schematic, and PCB desigr	Developed	Developed	Developed		Introduced		Introduced	Developed			Introduced	Developed	Developed	Developed	Mastered	Mastered
ELEC3117	CLO3 Work in a small development team to present a product proposal and write a formal proje	Developed	Developed	Developed		Developed		Introduced	Introduced		Introduced	Introduced	Mastered	Developed	Developed	Mastered	Mastered
ELEC3117	CLO4 Consider the ethical implications of recognising when it is important to conduct patent s	Introduced	Introduced	Introduced		Introduced		Introduced	Introduced			Introduced	Introduced	Introduced	Introduced	Developed	Mastered
ELEC3117	CLO5 Prioritise safety and sustainability by applying knowledge of manufacturing processes, el	Introduced	Introduced			Introduced		Introduced	Introduced		Introduced	Introduced	Introduced	Introduced	Introduced	Introduced	Mastered
Level 4	Level 4 Core Courses - 24 credit points																
ELEC4122	ELEC4122 Strategic Leadership and Ethics						**Mastered**					**Mastered**	**Mastered**				**Mastered**
ELEC4122	CLO1 Identify ethical problems in the context of engineering practice and identify ethical decision models.						Introduced					Introduced	Developed				Developed
ELEC4122	CLO2 Apply the concepts embodied in codes of ethical conduct to professional situations, ensuring that engineering solutions contribute to a sustainable future.						Developed					Developed	Developed				Developed
ELEC4122	CLO3 Critically assess and discuss conflicting view and attitudes on ethical issues in respectful and inclusive dialogue.						Developed					Developed	Developed				Developed
ELEC4122	CLO4 Explain effective leadership roles and strategies and apply them in a variety of workplace settings.						Introduced					Introduced	Developed				Developed
ELEC4122	CLO5 Exhibit persuasive verbal communication skills, and effective teamwork evidenced by strong and sustained contributions from every member.						Mastered					Mastered	Mastered				Mastered
ELEC4123	ELEC4123 Electrical Design Proficiency	**Mastered**		**Developed**		**Mastered**	**Developed**		**Mastered**	**Mastered**	**Mastered**	**Developed**			**Mastered**	**Mastered**	**Mastered**
ELEC4123	CLO1 Demonstrate the ability to work on individual design tasks while contributing to and learn	Introduced		Introduced		Developed	Introduced	Developed	Developed	Developed	Developed	Introduced			Developed	Developed	Developed
ELEC4123	CLO2 Produce designs which draw upon the various disciplines studied in previous courses in	Mastered		Developed		Developed	Introduced	Developed	Developed	Proficient	Proficient	Introduced			Developed	Developed	Developed
ELEC4123	CLO3 Demonstrate the ability to work as a team on a group design task.	Introduced		Introduced		Developed	Developed	Developed	Developed	Developed	Developed	Developed			Mastered	Mastered	Mastered
ELEC4123	CLO4 Develop a sufficient level of understanding and engineering design skills within a range o	Developed		Developed		Developed	Developed	Developed	Developed	Developed	Developed	Developed			Introduced	Introduced	Introduced
ELEC4123	CLO5 Explain, evaluate, and reflect on design decisions as well as implement them to achieve tl	Developed		Developed		Mastered	Developed	Mastered	Mastered	Mastered	Mastered	Developed			Mastered	Mastered	Mastered
ELEC4951	ELEC4951 Research Thesis A			**Mastered**	**Mastered**	**Mastered**	**Mastered**	**Mastered**	**Mastered**	**Mastered**	**Mastered**	**Mastered**	**Mastered**	**Mastered**	**Mastered**	**Mastered**	**Mastered**
ELEC4951	CLO1 Develop a design or a process or investigate a hypothesis following industry and professional engineering standards.									Mastered	Mastered						

Fig. 1: Screenshot of detailed CLO-PLO mapping

NOTE: **PLO1**Comprehensive theory-based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering; **PLO2** Conceptual understanding of the mathematics, numerical analysis, statistics and computer and information sciences which underpin the engineering discipline: **PLO3** In-depth understanding of specialist bodies of knowledge within the engineering discipline; **PLO4** Discernment of knowledge development and research directions within the engineering discipline; **PLO5** Knowledge of engineering design practice and contextual factors impacting the engineering discipline; **PLO6** Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice; **PLO7**Application of established engineering methods to complex engineering problem solving; **PLO8**Fluent application of engineering techniques, tools and resources; **PLO9**Application of systematic engineering synthesis and design processes; **PLO10** Application of systematic approaches to the conduct and management of engineering projects; **PLO11** Ethical conduct and professional accountability; **PLO12** Effective oral and written communication in professional and lay domains; **PLO13** Creative, innovative and pro-active demeanour; **PLO14** Professional use and management of information; **PL15** Orderly management of self and professional conduct; **PL16** Effective team membership and team leadership.

The data from the Excel file is then used to produce another detailed Excel file that contains PLOs (EA Stage 1 Competency elements) heatmap that has the scored mapping of PLOs (the 16 EA Stage 1 (PE1.1, PE1.2, …, PE3.5, PE3.6) Competency elements) – the scores being the counts of introduced, developed, proficient attainments).

7. Assessments

7.1. Assessment types used within the specialisation

The mixture of assessment types used within the program is shown below in Figs.2-4.

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”.

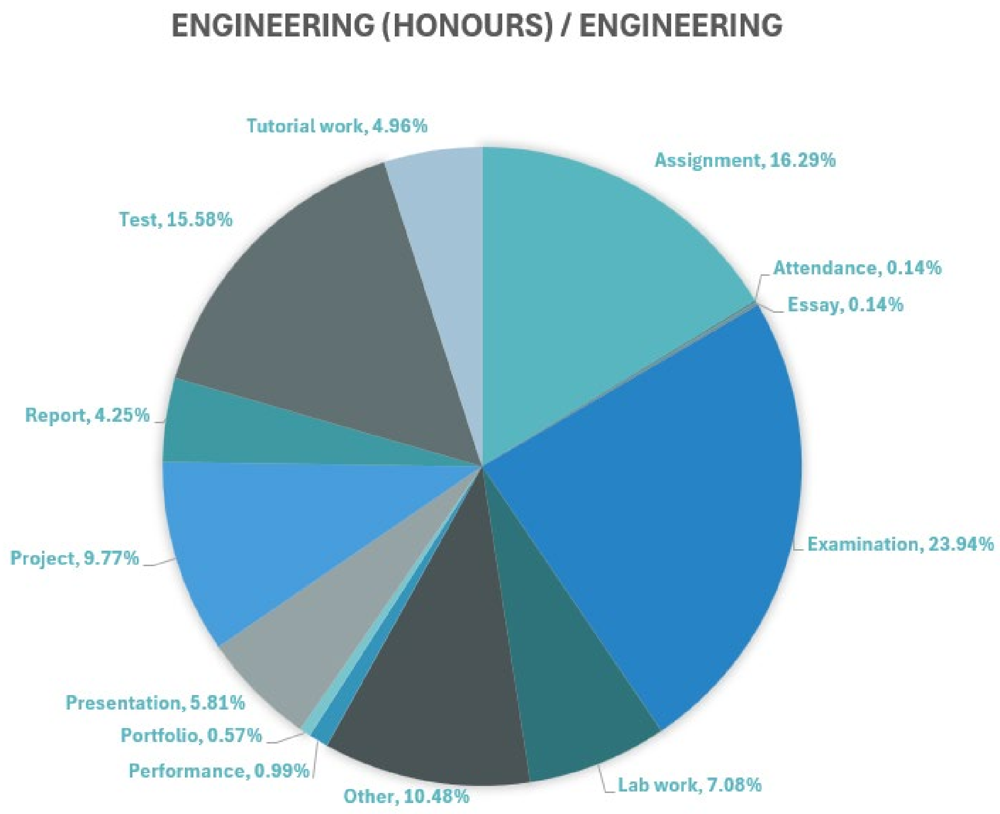

Fig. 2. Percentage of assessment types used within the specialisation.

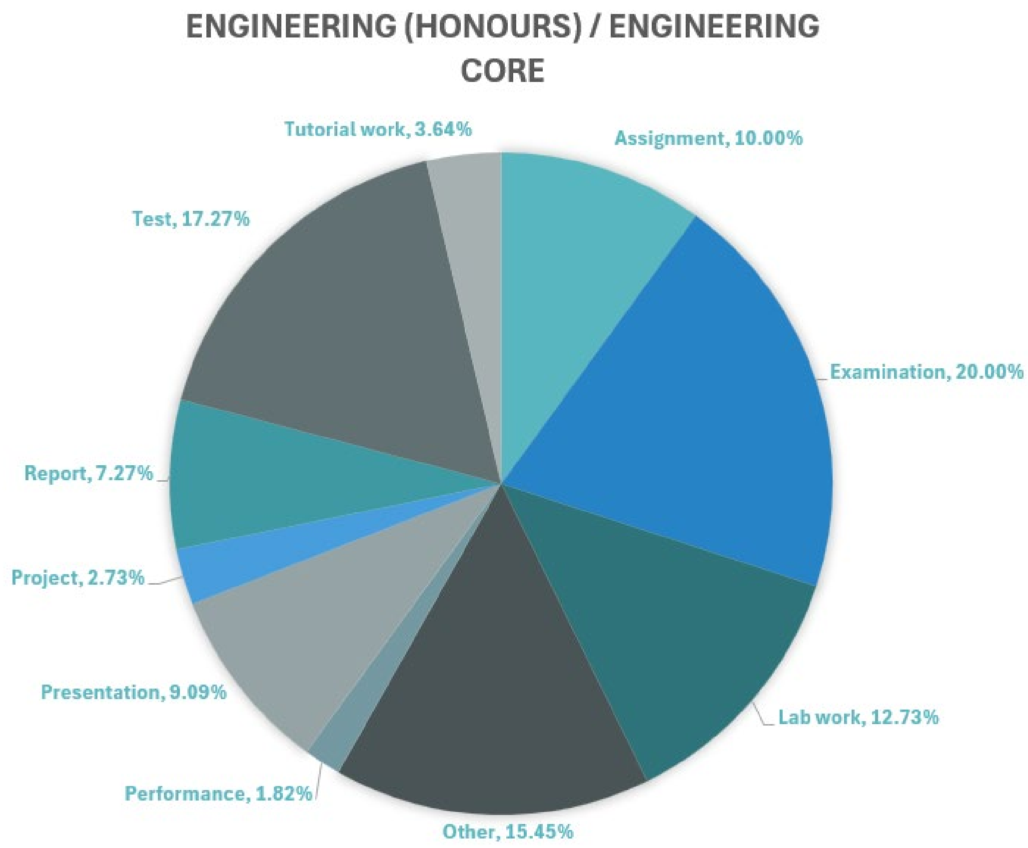

Fig. 3. Percentage of assessment types used within the core of the specialisation.

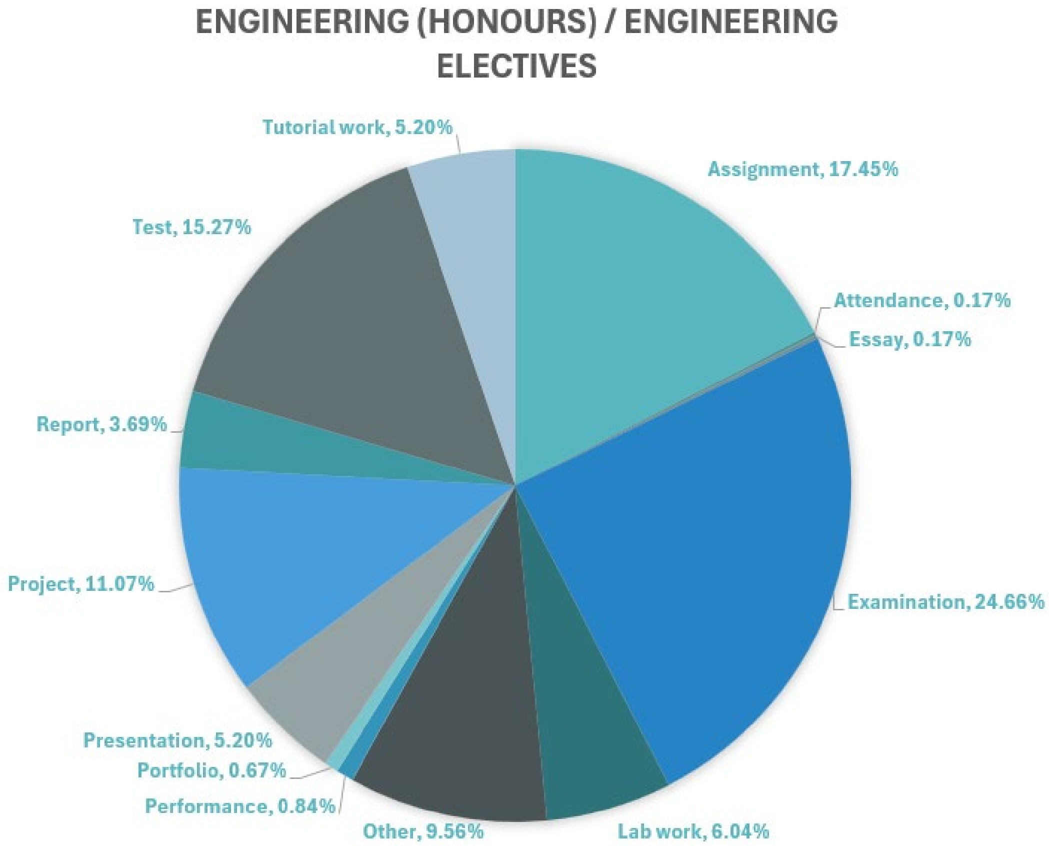

Fig.4: Percentage of assessment types used within the electives of the specialisation.

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) across both the Bachelor and Master components, ensuring a coherent and cumulative learning experience throughout the five-year integrated 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 Design Proficiency serve as critical points where students demonstrate the synthesis of knowledge, problem-solving, communication, teamwork, and ethical practice. In the BEME program, these are complemented by advanced Master-level coursework and research components, which provide additional opportunities for students to demonstrate depth of expertise, innovation, and interdisciplinary integration. 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 integrated Bachelor of Engineering (Honours) / Master of Engineering (Electrical Engineering) 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 Standards 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. 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. In the BEME program, reflective practice is further extended into the Master-level coursework and research components, where students critically evaluate their advanced technical work and interdisciplinary minor studies, articulating how these experiences contribute to their readiness for professional engineering practice at AQF Level 9.

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.

In some courses 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, 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. In the BEME program, these practices extend into postgraduate-level coursework and research, where students are expected to critically evaluate AI-assisted methods in advanced technical projects and interdisciplinary contexts, ensuring independent judgment and alignment with professional responsibility standards.

8. Specialisation Progression Plan

The programs offered by the School of EE&T are designed to progressively cultivate student autonomy, critical thinking, and lifelong learning skills. The curriculum scaffolds independent learning, reflective practice, peer and self-assessment across all stages of the program, ensuring students are well-prepared for professional engineering practice. Progression plans are embedded throughout the curriculum, providing students with clear developmental milestones and documented pathways that allow both staff and students to monitor capability growth from foundational knowledge to advanced professional practice.

Years 1–2: Building Foundations for Independent Learning (Bachelor component)

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 (Bachelor component)

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

- 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.
- Digital Signal Processing is structured around the Tiered Learning Framework (TLF), a student-driven learning framework for course and assessment design. The TLT 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.
- 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 (Bachelor component)

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

- 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.

- 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.
- 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.

Year 5: Advanced Reflection and Professional Self-Assessment (Master component)

In the BEME program, the fifth year extends progression into postgraduate-level coursework and research, with a strong emphasis on reflection and self-assessment as students consolidate their professional identity. The curriculum is deliberately structured to ensure that students critically evaluate their advanced technical work, interdisciplinary learning, and readiness for professional practice at AQF Level 9.

A central element of this stage is the Master's project sequence, which requires students to undertake substantial independent research or design projects. These courses explicitly embed reflective practice and self-assessment through:

- Independent planning and execution of advanced engineering investigations, requiring students to set their own objectives and monitor progress against defined milestones.
- Critical literature review and synthesis of current research, encouraging students to benchmark their work against international standards and identify gaps in their own knowledge.
- Structured reports at each stage of the thesis.
- Peer feedback during oral presentations and poster sessions, providing opportunities to reflect on communication effectiveness.

In addition to the Master's project, postgraduate coursework electives and the compulsory minor outside electrical engineering further reinforce reflective practice. Students are encouraged to critically assess how interdisciplinary knowledge complements their core expertise.

These culminating experiences demonstrate students' capacity for autonomous learning, critical review, and professional self-awareness. Progression plans in Year 5 serve as a comprehensive record of graduate capability development, capturing evidence from the Master's project, advanced coursework, and interdisciplinary minor. These plans explicitly track the trajectory from undergraduate foundations to postgraduate-level autonomy, ensuring students, staff, and accrediting bodies can clearly monitor capability growth and confirm readiness for Engineers Australia Stage 1 Competency Standards.

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