



UNSW Engineering Education Specification

1. Program Overview

Program Title: Bachelor of Engineering (Honours)

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

Engineering Discipline: Mechanical Engineering

This report shows how the MECHAH Mechanical Engineering specialisation of the 3707 Bachelor of Engineering (Honours) program at UNSW fosters the Engineers Australia Level 1 Graduate Competencies in its students.

The Mechanical Engineering program meets the Engineers Australia Stage 1 Competency Standard by developing graduates with comprehensive technical knowledge, engineering application capabilities, and professional attributes. The curriculum integrates engineering fundamentals with specialist applications in mechanics, thermodynamics, fluid dynamics, and manufacturing, ensuring students develop the depth of expertise required by the Stage 1 Standard.

In addition, through design projects, laboratory work, team-based projects, and industry engagement, students build competencies in advanced problem-solving, sustainable practice, and project management, preparing them to contribute meaningfully to the engineering profession and society.

The report begins by addressing the specialisation's overall aims and its uniqueness. It then covers the specialisation plan, followed by the Specialisation Learning Outcomes. The process for developing and obtaining feedback to improve these SLOs is detailed. This is followed by the curriculum mapping that relates the individual courses to the Specialisation Learning Outcomes, the Specialisation Learning Outcomes to the Graduate Capabilities and the individual courses to the Graduate Capabilities.

2. Career Alignment

The specialisation prepares graduates for clearly defined professional roles across the breadth of Mechanical Engineering by aligning its learning outcomes and industry engagement with contemporary engineering practice. It provides a pathway to a Professional Engineer through Engineers Australia, with curriculum design informed by industry standards.

The specialisation equips graduates for both technical and leadership roles in consulting firms, construction contractors, energy companies, and manufacturing. It develops strong analytical, design and project-delivery capabilities through design-based learning, laboratory practice and industry-linked projects.

Professional preparation is embedded through the minimum 60 days of Industrial Training, which connects students with workplace expectations and engineering culture. Research literacy and innovation capability are strengthened through the final-year thesis.

Industry integration is sustained through guest seminars, employer engagement initiatives, thesis showcases, and regular participation in careers events. Students gain hands-on experience with the tools

shaping modern engineering practice, including CFD, FEA, and digital twins, ensuring they graduate work-ready for an evolving infrastructure landscape.

3. Specialisation Framework

The School Education Committee drafted the Stream Learning Outcomes (SLOs), specifically the SLOs for each of our accredited BE and ME specialisations, and assigned them to the Stream Coordinators. The drafts were developed considering benchmarking conducted for the 2021 accreditation report, feedback from industry partners, and expectations of graduate outcomes aligned with EA Stage 1 competencies.

The draft SLOs were reviewed and aligned by the Deputy/Associate Head of School (Education) before being presented to the School Education Committee for endorsement. School Industry Advisory Board (IAB) consultation was sought in writing, with a follow-up workshop. They are periodically reviewed by the IAB and this will be completed next in 2026.

The SLOs align with the Engineers Australia expectations for a graduate engineer but are articulated in a Mechanical Engineering context. Reference is made to both Mechanical specific knowledge and skills.

On successful completion of the MECHAH3707 program, graduates will be able to:

SLO1	Demonstrate proficiency of knowledge in the enabling sciences (mathematics, computer science and physics) that form the foundation of mechanical engineering.
SLO2	Demonstrate expertise and technical knowledge in mechanical engineering disciplines such as: mechanics of both fluids and solids, materials, thermodynamics, design and manufacturing.
SLO3	Recognise and comply with the national and international standards and regulatory environment which practising Mechanical Engineers operate within.
SLO4	Use appropriate analytical, computational and AI tools, both general and specialised, to solve complex problems in mechanical engineering.
SLO5	Design and implement innovative engineering solutions to complex problems in mechanical engineering based on rigorous analysis and application of critically evaluated current research.
SLO6	Lead and manage mechanical engineering projects, individually or as part of a team, in a systematic and professional manner.
SLO7	Apply distinct professional judgement that contributes to the ethical and sustainable practice of mechanical engineering.
SLO8	Communicate professionally and effectively within and outside of mechanical engineering.

4. Continuous Improvement

The Head of School, the Deputy Head (Education), Associate Head of School (Education), and the Deputy Head (Academic) and School Education Committee (SEC) have the overall responsibility for the management of the undergraduate and postgraduate coursework programs within the School. The committee meets regularly to discuss coordination of teaching, program review, designing new courses

and revision of existing courses, course organisation and administration, students' feedback on courses, etc.

Proposals for new courses or course revisions relating to a particular discipline are born out of discussion among all staff in that discipline, as well as relevant industry representatives. New proposals for both undergraduate and postgraduate elective courses are typically driven by discipline-specific academic staff and motivated by current industry or research trends. Course changes are first discussed at the SEC and then at the School level during School Management Committee meetings.

To ensure program design is informed by ongoing evaluation of practice, industry needs, and future demand, the School draws on regular input from the Industry Advisory Board and engagement with Industry Partners. The School has active partnerships with industry organisations that provide regular input on current practice and workforce needs, including through engagement with academic staff and guest lectures. In addition, as Australia's top-ranked Mechanical school, many courses are taught by academics who lead internationally recognised research programs. This leadership, together with strong industry links, keeps teaching research-informed and up to date.

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

A curriculum mapping has been conducted for the MECHAH Mechanical Engineering specialisation within the 3707 Bachelor of Engineering (Honours) program at UNSW. This specialisation aligns with all the Engineers Australia Stage 1 Graduate Competencies.

SLO 1 and SLO 2 coverage is concentrated primarily in Level 1 and Level 2 courses, where students develop mastery in enabling sciences. First-year courses such as MATH1131/1141, PHYS1121/1131, ENGG1300, and ENGG1811 provide foundational knowledge in mathematics, physics, and programming. Second-year courses like MATH2089, ENGG2400/2500, and MMAN2300/2700 further strengthen this foundation by introducing solid mechanics, fluid mechanics, and thermodynamics.

SLO 2 shows progression from introductory knowledge in Level 2 courses to proficiency in Level 3 and Level 4. Core Year 3 courses, including MECH3110 (Mechanical Design 1), MECH3610 (Advanced Thermofluids), and MMAN3400 (Mechanics of Solids 2), solidify technical knowledge. From Years 1–2, starting with courses such as DESN2000 (Engineering Design and Professional Practice), students learn how to recognise and comply with national and international standards while practising mechanical engineering (SLO 3) and how to develop professional judgement that supports the ethical and sustainable practice of mechanical engineering (SLO 7).

SLO 5 (designing, critiquing, and implementing sustainable engineering solutions) is clearly mapped throughout the curriculum. Students first experience design in DESN1000 at Level 1, refine these skills in DESN2000 at Level 2, and apply them proficiently in Level 3 courses such as MECH3110. The capstone Thesis sequence in Level 4 demonstrates their capability at an advanced level.

Recommended discipline electives like MECH4620 (Computational Fluid Dynamics), MMAN4110 (Finite Element Methods), and MMAN9350 (Digital and Artificial Intelligence Technologies for Engineering Applications) help students achieve proficiency in computational and AI tools to solve complex mechanical engineering problems (SLO 4).

Discipline electives in Levels 3-4 also provide opportunities for students to achieve proficiency in specialised areas aligned with their career goals, including MMAN4400 (SLO 6) and MMAN3000 (SLO 8).

The curriculum mapping ensures alignment between CLOs, SLOs, and PLOs within the specialisation. CLOs are designed by the specialisation lead to support relevant SLOs, addressing the specific technical knowledge, skills, and practices expected from students. Each assessment task is directly mapped to CLOs to measure student achievement accurately.

Table 1. Mapping of the stream learning outcomes to the Engineers Australia Stage 1 Competencies

SLO/PLO	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PLO13	PLO14	PLO15	PLO16
1. Demonstrate proficiency of knowledge in the enabling sciences (mathematics, computer science and physics) that form the foundation of mechanical engineering.	x	x														
2. Demonstrate expertise and technical knowledge in mechanical engineering disciplines such as: mechanics of both fluids and solids, materials, thermodynamics, design and manufacturing.			x	x	x											
3. Recognise and comply with the national and international standards and regulatory environment which practising Mechanical Engineers operate within.						x					x			x		
4. Use appropriate analytical, computational and AI tools, both general and specialised, to solve complex problems in mechanical engineering.							x	x	x							
5. Design and implement innovative engineering solutions to complex problems in mechanical engineering based on rigorous analysis and application of critically evaluated current research.							x	x	x							
6. Lead and manage mechanical engineering projects, individually or as part of a team, in a systematic and professional manner.						x				x			x	x	x	x
7. Apply distinct professional judgement that contributes to the ethical and sustainable practice of mechanical engineering.						x					x				x	
8. Communicate professionally and effectively within and outside of mechanical engineering.												x	x			

Table 2. Mapping of courses to the stream learning outcomes

CLO	1. Demonstrate proficiency of knowledge in the enabling sciences (mathematics, computer science and physics) that form the foundation of mechanical engineering.	2. Demonstrate expertise and technical knowledge in mechanical engineering disciplines such as: mechanics of both fluids and solids, materials, thermodynamics, design and manufacturing.	3. Recognise and comply with the national and international standards and regulatory environment which practising Mechanical Engineers operate within.	4. Use appropriate analytical, computational and AI tools, both general and specialised, to solve complex problems in mechanical engineering.	5. Design and implement innovative engineering solutions to complex problems in mechanical engineering based on rigorous analysis and application of critically evaluated current research.	6. Lead and manage mechanical engineering projects, individually or as part of a team, in a systematic and professional manner.	7. Apply distinct professional judgement that contributes to the ethical and sustainable practice of mechanical engineering.	8. Communicate professionally and effectively within and outside of mechanical engineering.
Level 1 Core Courses								
COMP1511 Programming Fundamentals	Developed			Developed	Developed			Developed
COMP1911 Computing 1A	Developed			Developed	Developed			Developed

DESN1000 Introduction to Engineering Design and Innovation	Introduced	Introduced		Introduced	Developed	Developed	Developed	Developed
ELEC1111 Electrical Circuit Fundamentals	Developed	Developed		Developed				
ENGG1300 Engineering Mechanics	Introduced	Introduced		Introduced				Introduced
ENGG1811 Computing for Engineers	Developed			Developed	Introduced			
MATH1131 Mathematics 1A	Developed			Developed	Developed			Developed
MATH1141 Higher Mathematics 1A	Developed	Developed		Developed	Developed			Developed
MATH1231 Mathematics 1B	Developed	Developed		Developed	Developed			Developed
MATH1241 Higher Mathematics 1B	Developed	Developed		Developed	Developed			Developed
MMAN1130 Design and Manufacturing		Introduced	Introduced	Introduced	Introduced	Introduced	Introduced	Introduced
PHYS1121 Physics 1A	Developed	Developed		Developed	Developed		Developed	Developed
PHYS1131 Higher Physics 1A	Developed			Developed	Developed		Developed	Developed
Level 2 Core Courses								
DESN2000 Engineering Design and Professional Practice			Developed	Developed	Developed	Developed	Developed	Developed
ENGG2400 Mechanics of Solids 1		Developed					Developed	Developed
ENGG2500 Fluid Mechanics for Engineers		Developed					Developed	Developed
MATH2018 Engineering Mathematics 2D	Developed			Developed				
MATH2019 Engineering Mathematics 2E	Developed			Developed				
MATH2089 Numerical Methods and Statistics	Developed			Developed				
MMAN2300 Engineering Mechanics 2		Developed						Developed
MMAN2700 Thermodynamics		Developed						
Level 3 Core Courses								
DESN3000 Strategic Design Innovation			Developed		Developed	Proficient	Proficient	Proficient
MECH3110 Mechanical Design 1		Developed	Developed	Developed	Developed	Developed	Developed	Developed
MECH3610 Advanced Thermofluids		Developed		Developed	Developed			
MMAN3200 Linear Systems and Control		Developed		Developed				
MMAN3400 Mechanics of Solids 2		Proficient	Proficient	Proficient	Developed	Developed	Developed	Proficient
Level 4 Core Courses								
MECH4100 Mechanical Design 2		Proficient		Proficient	Proficient	Proficient	Proficient	Proficient

Thesis Courses								
MMAN4951 Thesis A		Proficient	Proficient	Proficient	Proficient	Proficient	Proficient	Proficient
MMAN4952 Thesis B		Proficient	Proficient	Proficient	Proficient	Proficient	Proficient	Proficient
MMAN4953 Thesis C		Proficient	Proficient	Proficient	Proficient	Proficient	Proficient	Proficient
Recommended Discipline Electives								
ENGG3741 Introduction to Nuclear Engineering	Proficient	Proficient	Proficient	Developed	Developed	Developed	Proficient	Developed
MATS1110 Introduction to Materials for Engineering Applications	Developed	Developed	Developed	Developed	Developed		Developed	Developed
MECH4305 Fundamental and Advanced Vibration Analysis	Proficient	Proficient	Developed	Developed	Introduced			Developed
MECH4320 Engineering Mechanics 3								
MECH4620 Computational Fluid Dynamics	Developed	Developed		Developed		Developed		
MECH4880 Refrigeration and Air Conditioning 1		Proficient	Proficient	Proficient	Proficient		Proficient	Developed
MECH4900 Mechanics of Fracture and Fatigue		Developed	Developed	Proficient				
MECH9325 Fundamentals of Acoustics and Noise	Developed	Proficient	Proficient	Proficient	Proficient		Proficient	
MECH9420 Composite Materials and Mechanics		Proficient	Proficient	Proficient	Proficient	Proficient	Proficient	Proficient
MECH9650 Applied Bio and Microfluidics	Developed	Proficient		Proficient	Proficient	Developed	Proficient	Proficient
MECH9720 Solar Thermal Energy Design	Developed	Developed	Developed	Developed	Developed		Developed	Developed
MECH9761 Automobile Engine Technology	Developed	Proficient	Proficient	Developed	Proficient		Proficient	Proficient
MMAN4200 Additive Manufacturing	Introduced	Developed	Introduced	Developed	Developed	Developed		Developed
MMAN4400 Engineering Management		Developed	Developed	Developed	Developed	Proficient	Proficient	Developed
MMAN4410 Finite Element Methods		Proficient		Proficient	Proficient	Proficient	Proficient	Proficient
MMAN9350 Digital and Artificial Intelligence Technologies for Engineering Applications	Developed	Developed		Proficient	Developed	Developed	Developed	Developed
Discipline Electives								
AERO9500 Space Systems Architectures and Orbits	Proficient	Proficient		Developed	Introduced			Introduced
AERO9610 The Space Segment		Proficient			Proficient	Proficient		
AERO9660 Advanced Aerospace Propulsion		Proficient		Proficient	Proficient			

COMP3331 Computer Networks and Applications	Proficient	Proficient	Proficient	Proficient	Developed	Developed	Developed	Proficient
ENGG2600 Engineering Vertically Integrated Project	Developed	Developed		Developed	Developed	Developed	Developed	Developed
ENGG3001 Fundamentals of Humanitarian Engineering		Developed	Developed		Developed	Developed	Proficient	Proficient
ENGG3060 Rehabilitation and Assistive Technology		Proficient		Developed	Proficient	Proficient	Proficient	Proficient
ENGG3600 Engineering Vertically Integrated Project	Developed	Proficient		Developed	Proficient	Proficient	Proficient	Proficient
ENGG4600 Engineering Vertically Integrated Project	Developed	Proficient		Developed	Proficient	Proficient	Proficient	Proficient
ENGG4841 Systems Engineering Fundamentals		Developed	Developed	Developed	Proficient	Proficient	Developed	Developed
MANF4430 Reliability and Maintenance Engineering		Proficient	Proficient	Proficient	Proficient	Proficient	Developed	Developed
MANF4611 Process Modelling and Simulation	Developed	Developed		Proficient	Proficient	Developed		
MANF6860 Strategic Manufacturing Management		Developed	Developed			Developed	Developed	Developed
MANF9400 Industrial Management		Developed	Developed		Developed	Developed	Developed	Developed
MANF9420 Operations and Supply Chain Management in Engineering		Developed	Developed	Developed	Developed	Developed	Developed	Developed
MANF9472 Production Planning and Control					Developed		Developed	Developed
MECH4100 Mechanical Design 2		Proficient		Proficient	Proficient	Proficient	Proficient	Proficient
MECH4770 Fundamentals and Design of Electrochemical Energy Storage Systems		Proficient		Proficient	Proficient	Proficient	Proficient	
MMAN4250 Micro/Nanofabrication and Technology	Developed	Proficient	Developed	Developed	Proficient		Developed	
MTRN4231 Robotics Project	Developed	Developed		Developed	Proficient	Developed	Developed	Developed
MTRN9400 Control of Robotic Systems	Developed				Introduced	Introduced		
SOLA5052 Bioenergy and Renewable Fuels		Proficient		Developed	Proficient	Developed	Proficient	
SOLA5053 Wind Energy Converters	Developed	Proficient		Proficient	Proficient	Developed	Proficient	
SOLA5056 Sustainable Energy for Developing Countries		Developed	Developed	Developed	Proficient	Proficient	Developed	Proficient
SOLA5057 Energy Efficiency		Proficient	Developed	Proficient	Proficient	Proficient	Proficient	Proficient



7. Assessments

A complete overview of the assessment types is provided in Figures 1-3. Figure 1 shows assessment distribution for all specialisation courses, while Figures 2 and 3 show assessment distribution for core and elective courses, respectively.

Analysis of assessment distribution in core courses (Figure 2) reveals that assessments are well-distributed, though invigilated/secure components remain dominant with 42.86% combined of tests (23.31%) and examinations (19.55%). This is followed by assignments (15.04%) and lab-work (11.28%). As is typical of many streams, early courses are content-driven, and the assessments reflect a need to demonstrate individual learning in tests or examinations. Laboratory work constitutes 11.28% of core assessment, providing hands-on experience in experimental methods, data collection, and scientific reporting, fundamental for the different mechanical engineering disciplines.

Analysis of assessment distribution in elective courses (Figure 3) shows distinct patterns that reflect opportunities for specialisation. Assignments (27.63%) comprise the largest single proportion, while exams (combined 33.56% between tests and examinations) remain significant. This shift in electives enables students to engage deeply with specialised topics through research, design tasks, and case study analysis aligned with their career interests. The elective portfolio includes greater diversity, with reports (10.53%) and projects (10.53%) allowing for substantial design and research work.

The thesis pathway (MMAN4951/4952/4953) scaffolds independent research and professional work, with students demonstrating progressive capability through draft chapters, literature reviews, methodology reports, and final thesis documents. These courses provide extensive formative feedback through regular supervisor meetings and milestone reviews.

Reflective practice and peer assessment are embedded throughout the program to develop metacognitive awareness and critical evaluation skills. Design courses (DESN1000, DESN2000, DESN3000) require students to maintain design journals documenting their learning process, design iterations, and team collaboration experiences. The School has implemented many processes to ensure that academic integrity is maintained:

- All exam papers are reviewed by another academic, along with worked solutions.
- Online exams use as much randomisation as practically possible for the question type (question banks, numerical input randomisation and in some cases multiple parallel versions of questions with slightly different solution paths). Post-COVID online assessments are generally discouraged throughout all courses in the school to guarantee academic integrity.
- For many exam-style assessments, pen and paper answers are uploaded to Moodle via an ExamScan process managed by faculty. This improves marking procedures, especially when done at scale in large courses.
- In-person lab activities have been centre stage in our program and have been increased substantially as our programs have moved back to in-person face-to-face delivery modes.
- Academics are encouraged to include open-ended elements in all their examination questions, with students answering short essay-style questions. This enables the marker to check the alignment between simple answers and comprehension.
- Reports are submitted using TurnItIn, which ensures that students are not plagiarising or colluding, but does not deter some forms of contract cheating.

- Model report/assignment rubrics have been provided to reward open-ended and creative solutions by students to discourage collusion and contract cheating. These have shown some initial promise, but much more evaluation and testing are required.
- Important works, such as thesis, have two (or three) markers to ensure consistency.
- Some courses have taken on viva-style assessments for all students, but these have proved challenging at scale without centralised support for scheduling.

MECHANICAL ENGINEERING

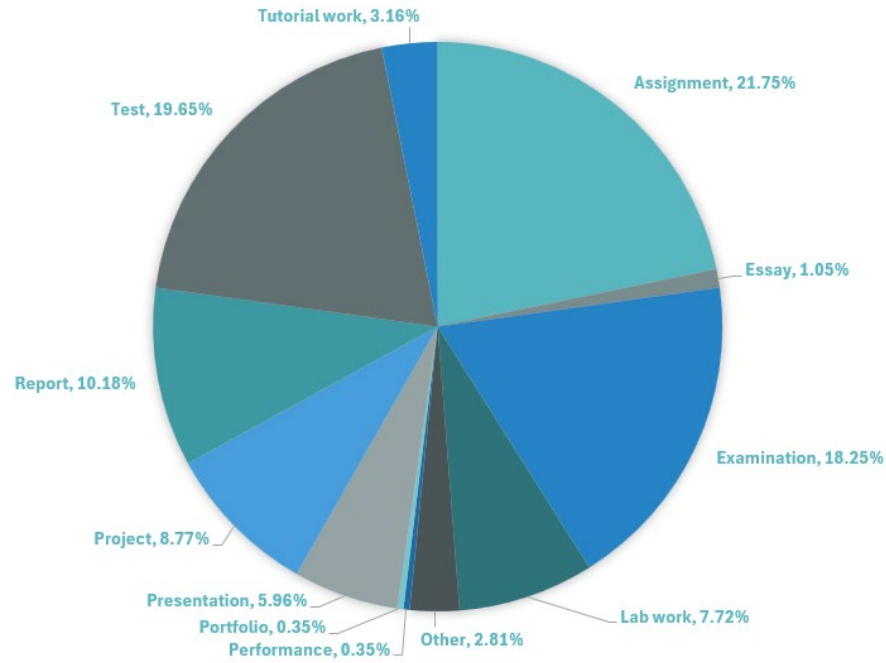


Figure 1. Percentage of assessment types used within the specialisation.

MECHANICAL ENGINEERING CORE

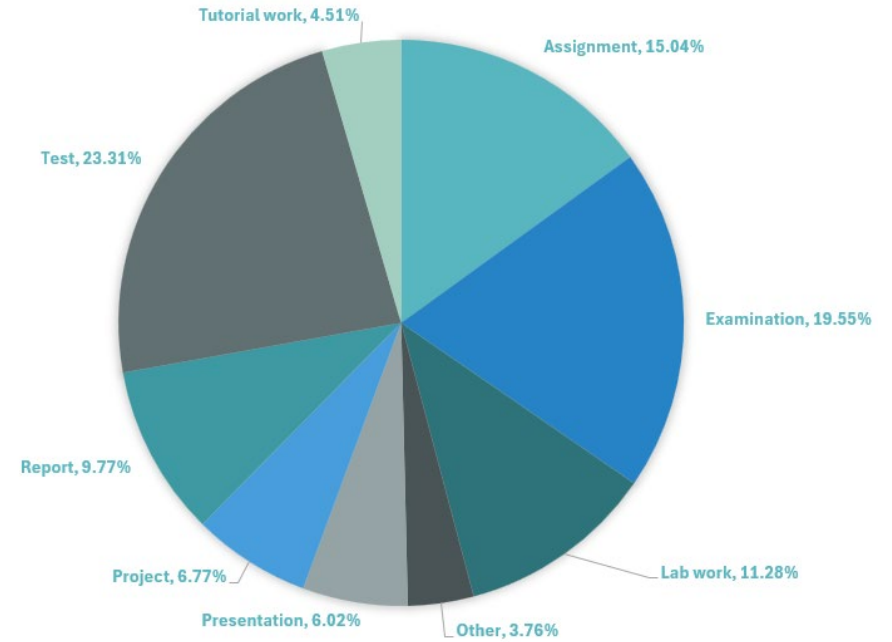


Figure 2. Percentage of assessment types used within the core of the specialisation.

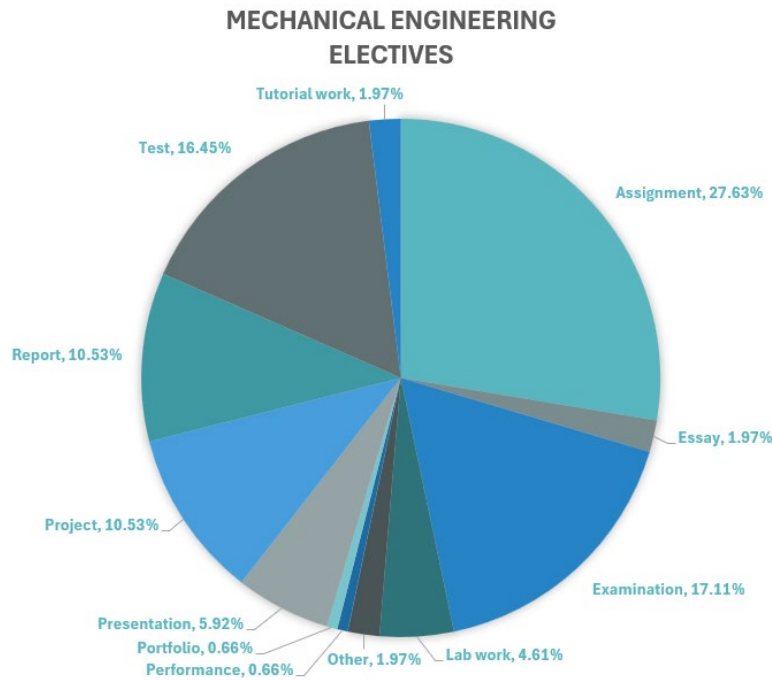


Figure 3. Percentage of assessment types used within the electives of the specialisation.

8. Specialisation Progression Plan

The structure of the MECHAH specialisation ensures that graduate-level capabilities are developed through science and programming courses in Year 1, core courses in Years 2 and 3, and specialised knowledge in Year 4. This scaffolding approach allows students to reflect on their learning, enabling them to self-assess and develop graduate capabilities aligned with their interests or career aspirations.

To this end, students are supported in monitoring and adjusting their study progress through UNSW's official advising channels. Program information and enrolment support are provided through The Nucleus: Student Hub. Specialisation-specific level support is provided by designated year advisors whom the School appoints. A study plan specific to each term entry and a progression checklist is provided to the student. In addition, the myPlan online tool combines the study plans progression checklist into a single interactive tool that allows students and staff to schedule courses, view prerequisites, and track progress toward graduation in real time.

Each term, students use myPlan to confirm which requirements they have completed, which remain, and which prerequisite sequences apply, which supports self-checking of readiness for later-stage courses and informed elective selection.

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](#)