UNSW SYDNEY

UNSW Engineering

Education Specification

1. Program Overview

Program Title: Bachelor of Engineering (Honours)

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

Engineering Discipline: Mining Engineering

The Bachelor of Engineering (Mining Engineering) specialisation at UNSW is designed to meet the Engineers Australia Stage 1 Competency Standard by developing in its graduates the knowledge, skills, and professional attributes required for entry into the engineering profession. The curriculum combines advanced technical knowledge in mining engineering with a focus on analytical thinking, problem-solving, and design. Through a combination of coursework, design projects, and research components, students progressively develop competence across the three key areas defined by Engineers Australia: knowledge and skill base, engineering application ability, and professional and personal attributes.

The program title, Bachelor of Engineering (Mining Engineering), accurately reflects both the professional level and disciplinary focus of the qualification. The title aligns with Engineers Australia's nomenclature for accredited programs and ensures clear recognition within the mining industry and broader engineering community. The discipline focus on mining engineering is evident through courses that address mine planning, rock mechanics, mineral processing, sustainability, and health and safety, providing students with the capability to manage complex engineering systems within resource extraction industries.

The curriculum is structured around SLOs that are explicitly mapped to the Engineers Australia Graduate Competencies and UNSW Graduate Capabilities. Regular review and feedback from industry partners, academic staff, students, and professional bodies ensure that the content remains current and aligned with evolving industry needs and accreditation standards.

2. Career Alignment

The Mining Engineering specialisation is purposefully designed to align students' learning experiences with real-world career pathways across the mining and resources sector. It equips graduates with the technical expertise, professional judgement, and leadership capabilities required to meet the evolving needs of an increasingly technology-driven and sustainability-focused industry.

Graduates are prepared for a broad range of professional roles, including mine planners, geotechnical and geomechanics engineers, and project managers. The program also provides a strong foundation for careers in emerging areas such as automation and digital mining, data-driven resource modelling, mine design, and environmental and waste management that are shaping the future of the mining profession.

Career alignment is achieved through a curriculum that integrates advanced technical knowledge with professional and managerial competencies. Students gain expertise in mine design and planning, mineral processing, environmental management, and hazard and risk control, supported by courses in engineering management and project planning. This combination ensures that graduates can lead multidisciplinary teams and contribute to the safe, efficient, and sustainable operation of mining projects from concept to closure.

A key strength of the program lies in its industry immersion and practical training. The compulsory 60-day industrial training component enables students to engage directly with operational mining environments, applying classroom theory to industry practice. Through this experience, students develop professional attributes highly valued by employers, adaptability, communication, teamwork, and ethical decision-making, while gaining a firsthand understanding of workplace expectations and regulatory standards.

Students also undertake a research or design project, allowing them to explore specific technical challenges relevant to their intended career path. Whether focusing on improving mineral recovery, enhancing mine safety systems, or developing digital tools for mine optimisation, this capstone experience fosters innovation and independent problem-solving, key attributes for practicing engineers.

The program is fully mapped to Engineers Australia Stage 1 Competencies, ensuring graduates meet the accreditation requirements for professional engineering practice under the Washington Accord. This accreditation facilitates international mobility and signals to employers that UNSW Mining Engineering graduates are career ready and equipped to perform to professional standards anywhere in the world.

By combining industry relevant learning, hands on training, and a globally recognised qualification, the Mining Engineering specialisation enables graduates to transition smoothly from study to employment. They emerge as skilled, adaptable professionals capable of contributing immediately to mining operations, consulting, or technology innovation across Australia and the global resources sector

3. Specialisation Framework

The initial significant work done to develop the Specialisation Learning Outcomes (SLOs) is rooted in the task group set by the Head of the School (HoS) in 2020 to develop MINEAH SLOs. The task group consisted of two senior professors, HoS, and the undergraduate director of teaching. The developed SLOs were circulated with all mining academics in the School and discussed with students in a focused consultation. SLOs were then presented to the School Teaching and Learning Committee (TLC) and Industry Advisory Board (IAB).

The final version of the SLOs incorporated all the comments from the TLC, students, and IAB. The final SLOs were then resubmitted to the TLC, School Management Committee (SMC) and IAB in turn for final endorsement.

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

1. Appreciation of the economic factors and drivers for the mining industry.
2. Embedded level of understanding and commitment to applying the principles of sustainable mining practices including socio-economic and environmental impacts.
3. Ability to plan, design, create, innovate, and manage rapidly changing technologies and complex datasets within the mining industry.
4. Ability to take a holistic view of all systems within a mining operation through comprehensive technical engineering knowledge and skills.
5. Advanced problem solving, analysis and synthesis skills and the ability to tolerate ambiguity.

6. Ability to think and work individually as well as communicate and engage effectively with a diverse range of stakeholders.
7. Being resilient and adaptable to all forms of mining in changing conditions and multi-cultural environments (both national and international).
8. Awareness and ongoing commitment to appropriate professional standards, the highest principles of ethical conduct, and lifelong learning.
9. Commitment to a risk-based management approach and a strong safety culture.

The attainment and application of these skills ensure that students meet the Engineers Australia Stage 1 competencies. This is recorded in the mapping of the specialisation learning outcomes with the Engineers Australia Stage 1 competencies, presented in section 6.

4. Continuous Improvement

The design of the Mining Engineering specialisation is guided by a continuous process of evaluation and alignment with current engineering practices, industry needs, and emerging trends in the mining sector. The specialisation offers a comprehensive range of courses aimed at developing the next generation of competent mining engineers who possess both specialised technical expertise and practical professional skills. Its strong focus on advanced engineering knowledge and the application of mining engineering techniques ensures that graduates are well prepared to tackle complex, real-world problems in mining operations. In addition, the inclusion of communication, leadership, and research training reflects the industry's increasing demand for engineers who can effectively manage multidisciplinary teams, adapt to technological advances, and contribute to innovation within their organisations.

Ongoing program evaluation and stakeholder feedback, through reviews of Course Learning Outcomes and Specialisation Learning Outcomes, highlight both strengths and areas for improvement. For instance, while the specialisation demonstrates strong technical foundations, reviews have identified gaps in the integration of design, project management, and professional engineering practices, particularly in the areas of ethics, health, and safety. Recognising that ethical and safety standards can vary significantly across engineering disciplines and industry settings, the School is committed to embedding these elements more explicitly within the specialisation. This reflects a proactive approach to ensuring that program content remains relevant and responsive to evolving professional and regulatory expectations.

In response to identified weaknesses, the School has implemented a strategic direction aimed at strengthening the integration of professional practice, communication, and applied engineering techniques across all courses. Specific courses have been identified where these competencies will be embedded and assessed to ensure that graduates not only acquire technical knowledge but also develop the professional judgement and interpersonal skills required in the workplace.

Assessment design within the program also reflects industry practices and promotes academic integrity. A substantial portion of assessment (15% to 100%) in technical courses is project- and report-based, simulating the types of tasks engineers encounter in professional practice. Laboratory assessments in courses such as Mineral Processing and Mine Geomechanics, as well as thesis and design projects, provide opportunities for students to apply theoretical knowledge to practical problems. The use of oral presentations, industry panel evaluations, and video submissions further enhances students' professional communication skills and prepares them for real-world engagement.

Academic integrity is reinforced through structured processes, including Turnitin submission for plagiarism detection, consistent use of marking rubrics, and dual and/or second markers for the moderation of major works such as theses. These measures not only uphold UNSW's academic standards but also mirror the accountability and quality assurance expected in professional engineering environments.

In summary, the Mining Engineering specialisation exemplifies a dynamic and evidence-based approach to curriculum design, informed by continuous evaluation, stakeholder input, and evolving industry requirements. This ensures that graduates are not only technically proficient but also equipped with the ethical awareness, safety consciousness, and professional competencies essential for success in a rapidly changing engineering landscape.

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

Table 1 presents a detailed mapping of the Specialisation Learning Outcomes (SLOs) to the Engineers Australia Stage 1 Competencies. The matrix demonstrates that the specialisation provides systematic coverage of all required competency areas. It shows the staged development of competencies. Initial-year courses introduce the SLOs, ensuring students acquire the necessary foundations. The 2nd and 3rd years courses build depth and progressively strengthen students' technical and professional capabilities. By Year 4, capstone and advanced discipline courses affirm proficiency across all outcomes, ensuring students meet the required graduate competency standards. This systematic alignment ensures vertical integration of learning and confirms that the specialisation provides the necessary scaffolding for students to achieve all required capabilities before entering professional practice.

Table 1. Mapping of the specialisation 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. Appreciation of the economic factors and drivers for the mining industry	X		X		X											
2. Embedded level of understanding and commitment to applying the principles of sustainable mining practices including socio-economic and environmental impacts	X		X		X	X		X								
3. Ability to plan, design, create, innovate, and manage rapidly changing technologies and complex datasets within the mining industry.		X	X	X	X		X	X					X			
4. Ability to take a holistic view of all systems within a mining operation through comprehensive technical engineering knowledge and skills.			X	X	X		X	X	X				X			
5. Advanced problem solving, analysis and synthesis skills and the ability to tolerate ambiguity.				X	X		X						X			
6. Ability to think and work individually as well as communicate and engage effectively with a diverse range of stakeholders.										X	X	X			X	X
7. Being resilient and adaptable to all forms of mining in changing conditions and multi-cultural environments (both national and international).					X	X				X				X		
8. Awareness and ongoing commitment to appropriate professional standards, the highest principles of ethical conduct, and lifelong learning.						X					X			X	X	
9. Commitment to a risk-based management approach and a strong safety culture.									X	X				X	X	

Table 2. Mapping of courses to the specialisation learning outcomes.

Course code	1. Appreciation of the economic factors and drivers for the mining industry	2. Embedded level of understanding and commitment to applying the principles of sustainable mining practices including socio-economic and environmental impacts	3. Ability to plan, design, create, innovate, and manage rapidly changing technologies and complex datasets within the mining industry.	4. Ability to take a holistic view of all systems within a mining operation through comprehensive technical engineering knowledge and skills.	5. Advanced problem solving, analysis and synthesis skills and the ability to tolerate ambiguity.	6. Ability to think and work individually as well as communicate and engage effectively with a diverse range of stakeholders.	7. Being resilient and adaptable to all forms of mining in changing conditions and multi-cultural environments (both national and international).	8. Awareness and ongoing commitment to appropriate professional standards, the highest principles of ethical conduct, and lifelong learning.	9. Commitment to a risk-based management approach and a strong safety culture.
Level 1 Core Courses									
DESN1000		Introduced	Introduced	Introduced	Introduced	Introduced		Introduced	Introduced
ENGG1300				Introduced	Introduced	Introduced			Introduced
ENGG1811					Introduced				
GEOS1111	Introduced	Introduced		Introduced	Introduced				
MATH1131					Introduced	Introduced			
MATH1141					Introduced	Introduced			

MATH1231					Introduced	Introduced			
MATH1241					Introduced	Introduced			
PHYS1121					Introduced				Introduced
PHYS1131					Introduced				Introduced
Level 2 Core Courses									
CEIC2001				Introduced	Introduced				
DESN2000	Developed	Developed	Developed	Developed	Developed	Developed	Introduced	Introduced	Developed
ENGG2400					Introduced	Developed			Developed
MATH2018					Developed				
MATH2019					Developed				
MATH2089					Developed				
MERE2810	Introduced		Introduced	Developed	Proficient			Introduced	Developed
MINE2820	Introduced	Introduced		Developed					
Level 3 Core Courses									
MINE3220	Proficient	Developed	Proficient	Proficient	Proficient	Proficient		Developed	Developed
MINE3230	Developed	Developed		Developed	Developed		Developed		Developed
MINE3310	Developed	Developed	Proficient	Developed	Proficient			Proficient	
MINE3430	Developed	Developed	Developed	Proficient	Developed		Introduced	Introduced	Developed
MINE3510	Developed	Developed	Proficient	Proficient	Developed		Proficient	Developed	Developed
MINE3630									
MINE3910	Developed	Proficient	Developed	Developed	Developed	Developed	Developed	Developed	Developed
Level 4 Core Courses									
MERE4951	Proficient	Proficient	Proficient	Proficient	Proficient	Proficient		Proficient	Proficient
MERE4952	Proficient	Proficient	Proficient	Proficient	Proficient	Proficient		Proficient	Proficient
MERE4953	Proficient	Proficient	Proficient	Proficient	Proficient	Proficient		Proficient	Proficient
MINE4250	Proficient	Developed	Developed	Proficient	Proficient	Proficient	Developed	Developed	Developed
MINE4310	Developed	Developed	Proficient	Proficient	Proficient		Proficient	Developed	Proficient
MINE4710	Proficient	Developed	Developed	Proficient	Proficient		Proficient	Proficient	Proficient
Discipline Electives List									
ENGG2600	Introduced	Introduced	Developed		Introduced	Introduced		Introduced	Introduced
ENGG3001						Developed		Developed	
ENGG3600	Developed	Developed	Proficient		Developed	Developed		Developed	Developed

ENGG4600	Proficient	Proficient	Proficient		Proficient	Proficient		Proficient	Proficient
MERE8810	Proficient	Developed	Proficient	Developed	Proficient			Developed	Developed
MINE5040	Developed	Developed	Proficient	Developed	Proficient	Developed	Developed	Developed	Developed
MINE5050	Developed	Developed	Proficient	Proficient	Proficient				Proficient
MINE5060									
MINE8120	Developed	Proficient	Proficient	Proficient	Proficient	Developed	Proficient	Developed	Proficient
MINE8130	Developed	Developed	Developed	Developed	Proficient		Developed	Developed	Developed
MINE8680	Developed		Proficient		Proficient	Proficient			Proficient
MINE8710	Developed	Developed	Proficient	Proficient	Proficient			Developed	Proficient
MINE8870	Proficient	Proficient	Proficient	Proficient	Proficient	Proficient		Proficient	Proficient
MINE8930	Proficient	Developed	Proficient	Proficient	Proficient				Proficient
MINE8940	Developed	Developed	Developed	Proficient	Proficient	Developed		Developed	Proficient
MINE8950	Developed	Proficient	Proficient	Developed	Proficient		Developed	Proficient	Proficient
Free Electives									
MINE1010	Introduced	Introduced		Introduced		Introduced			

7. Assessments

Assessment in the Mining Engineering specialisation is designed to validate course learning outcomes while progressively verifying program specialisation-level graduate capabilities. A balanced mix of examinations, tests, assignments, laboratory work, projects, presentations, reports and tutorial activities ensures that both conceptual understanding and applied engineering skills are assessed (see Figure 1). Reflective practice and critical review are developed through post-lab reflections, design critiques, and thesis/project progress reviews as presented in Figure 2. Self-assessment and peer assessment are embedded in group design tasks and project work, supporting teamwork, leadership and feedback literacy. Academics provide rubrics and worked solutions to markers. In this case the academic will re-mark a sample of the reports or exam papers to ensure the rubric is being used correctly. Important works, such as thesis, will have two markers to ensure consistency.

Broadly speaking, students are using generative AI. UNSW has instituted a ‘6-lane’ approach to the use of generative AI for the completion of assessment tasks.[1] At the start of each term, course convenors review their assessment tasks and decide on the level of generative AI permissible.

Overall, assessment tasks and grading schemas are intentionally aligned with the intended learning outcomes of each course and collectively serve to confirm graduates’ technical competence, communication skills, professional behaviour, and readiness for practice in subsurface engineering fields.

[1] This approach is described on the university website: https://www.unsw.edu.au/student/managing-your-studies/academic-skills-support/toolkit/ai

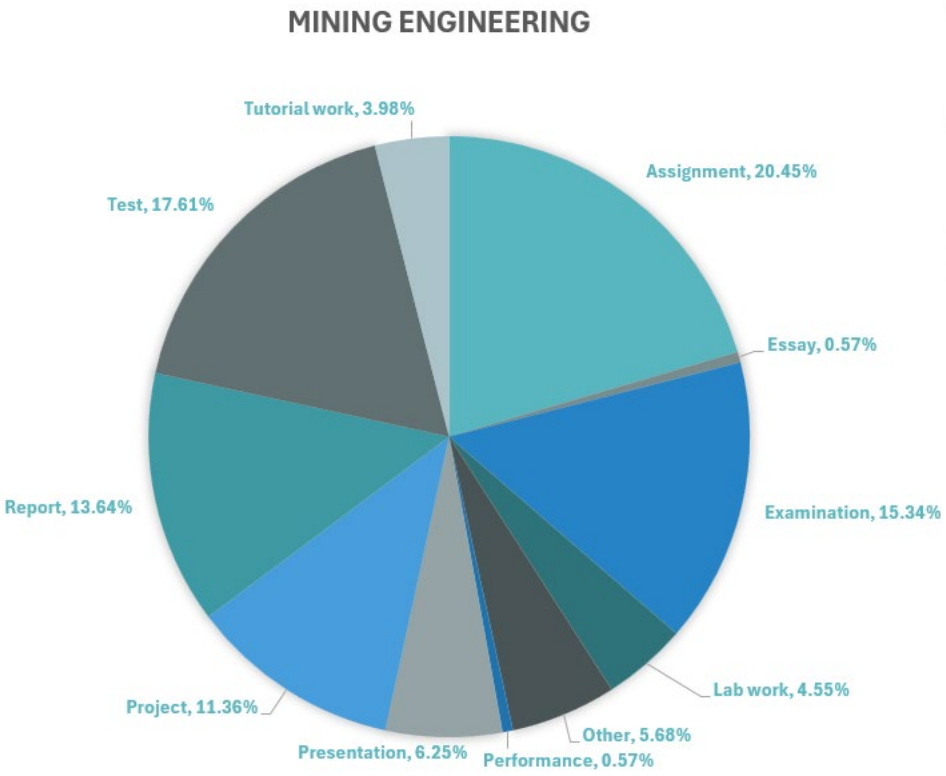

Figure 1. Percentage of assessment types used within the specialisation.

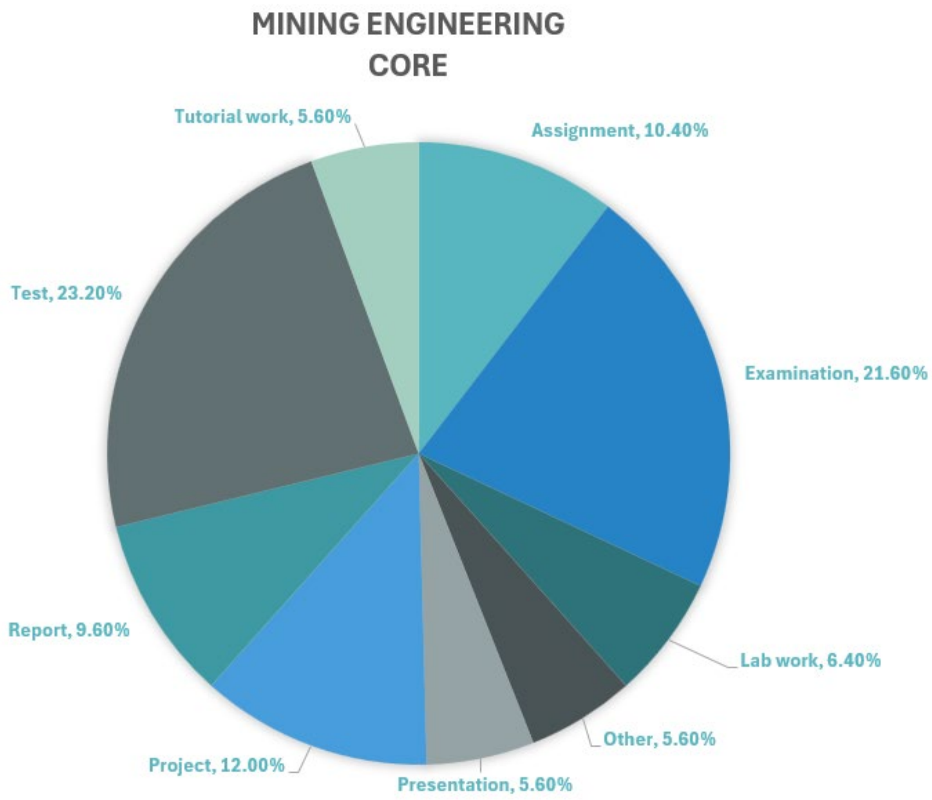

Figure 2. Percentage of assessment types used within the core of the specialisation.

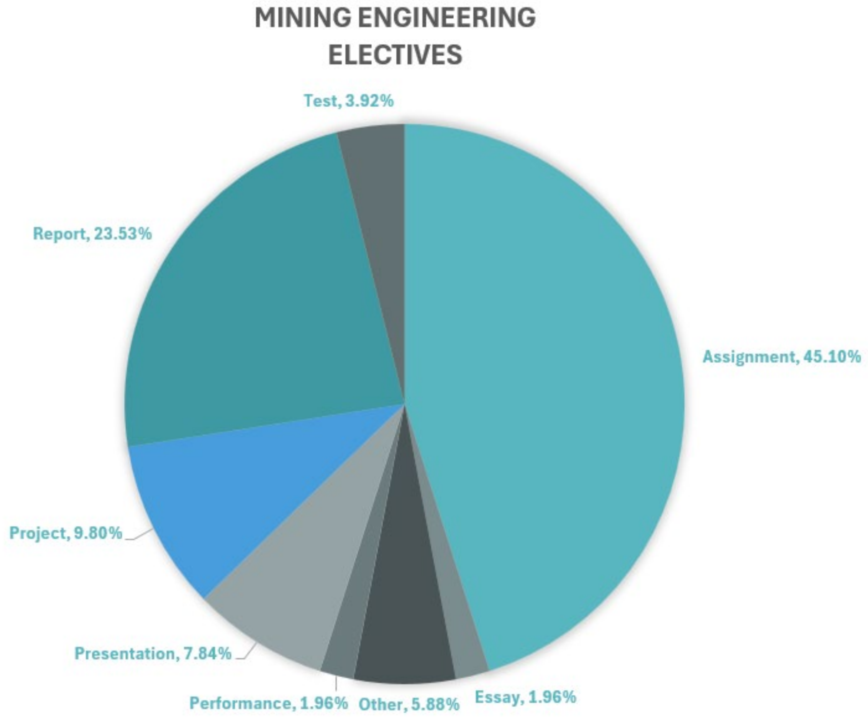

Figure 3. Percentage of assessment types used within the electives of the specialisation.

8. Specialisation Progression Plan

The program supports student reflection and self-assessment through a structured progression framework. The UNSW Handbook provides program rules and example T1/T2/T3 progression plans, and the MyPlan tool enables students to map their enrolment choices against program requirements and monitor their capability development over time. Additional support is provided by the UNSW Nucleus Student Hub, which assists students with progression checking, prerequisite planning and enrolment sequencing, enabling ongoing self-monitoring of academic and professional growth throughout the program.

Each course includes at least one assessment marked before census date, allowing students to gauge their understanding and adjust their enrolment or study strategies as needed. A consistent philosophy of feedback—incorporating formative comments and reflective assessment tasks—encourages students to evaluate their learning, recognise strengths, and identify areas for further development.

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