UNSW Engineering

Education Specification

1. Program Overview

Program Title: Bachelor of Engineering (Honours)

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

Engineering Discipline: Biomedical Engineering

The Bachelor of Engineering (Honours) (Biomedical Engineering) program is designed to meet the Engineers Australia Stage 1 Competency Standards by integrating foundational engineering principles with biological and medical sciences. The curriculum ensures that graduates develop the technical knowledge, problem-solving skills, and professional capabilities required for entry-level engineering practice.

The program title reflects the dual emphasis on engineering rigour and biomedical application. Biomedical Engineering is an interdisciplinary field that applies engineering methodologies to solve problems in biology and medicine, aiming to improve human health and healthcare systems. The discipline focus is justified by the growing demand for engineers who can innovate in areas such as medical devices, diagnostics, rehabilitation technologies, and health informatics.

Students gain competencies in:

- **Knowledge and Skill Base**: Through core studies in mathematics, physics, physiology, chemistry, and computing, students develop a strong foundation to address complex biomedical challenges.
- **Engineering Application Ability**: The program includes hands-on design projects, clinical immersion experiences, and industry training to ensure practical application of skills.
- **Professional and Personal Attributes**: Ethical practice, communication, teamwork, and development of lifelong learning strategies are embedded throughout the curriculum, preparing graduates for responsible and sustainable engineering practice.

The program is aligned with UNSW's strategic partnerships, including the Randwick Health & Innovation Precinct, providing students with exposure to cutting-edge research and clinical environments.

2. Career Alignment

The Biomedical Engineering specialisation will prepare graduates for diverse roles across healthcare and technology sectors, including:

- **Medical Device Design and Manufacturing**: Roles in companies developing implants, prosthetics, and diagnostic equipment.
- **Clinical Engineering**: Supporting hospital systems with technology integration and maintenance.

- **Digital Health and AI Applications**: Innovating in telehealth, wearable sensors, and data-driven diagnostics.
- **Rehabilitation and Assistive Technologies**: Designing solutions for improved patient mobility and quality of life.
- **Research and Development**: Contributing to biomedical innovation in academic, clinical, and commercial settings.

The curriculum will embed regulatory awareness, ethical practice, and interdisciplinary collaboration, skills highly valued by employers and essential for leadership in emerging fields such as personalised medicine and bioinformatics.

3. Specialisation Framework

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

1. Use methods, tools and ideas from mathematics, physics, chemistry, biology and computer science to solve complex biomedical engineering problems, employing both analytical and computational tools in a real-world context.
2. Evaluate current research findings and industry best practices to address multifaceted problems in Biomedical Engineering, considering both technological advancements and clinical implications.
3. Design and implement innovative biomedical technologies and systems, ensuring they meet safety, effectiveness and efficacy requirements using critical assessment methods and standards.
4. Apply ethical and professional judgement in the practice of Biomedical Engineering for sustainable and responsible solutions in healthcare.
5. Apply communication strategies to engage effectively with diverse audiences within and beyond the Biomedical Engineering field.
6. Implement project management tools and processes to the planning and execution of project work to a professional standard.
7. Evaluate personal development of learning through reflection on feedback to enhance the quality and impact of work.
8. Collaborate effectively with others to achieve a common objective or fulfil a common project and reflect critically on the process and the outcomes.

These outcomes ensure that graduates meet the three domains of the Stage 1 Competency Standards: Knowledge and Skill Base, Engineering Application Ability, and Professional and Personal Attributes.

4. Continuous Improvement

The specialisation will be continuously refined through structured feedback loops. Key mechanisms include:

- **Industry and Professional Input**. Regular engagement with the Industry Advisory Committee and the College of Biomedical Engineers (Engineers Australia) will ensure alignment with professional standards and emerging technologies.
- **Graduate and Employer Feedback**. Surveys and interviews will inform curriculum updates to meet evolving workplace expectations.
- **Benchmarking and Research Integration**. Comparative reviews against leading programs and incorporation of UNSW research strengths will keep the curriculum cutting edge.
- **Data-Driven Review**. Analysis of student performance, progression and myExperience feedback will identify areas for improvement.
- **Technology and Trend Monitoring**. Advances in the discipline, such as AI, digital health, and regenerative medicine, will guide elective offerings.

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

The School of Biomedical Engineering adopted a systematic process to set, review, and verify achievement of learning outcomes across the program. This process ensured alignment from assessment tasks to Course Learning Outcomes (CLOs) (Table 3), from CLOs to Specialisation Learning Outcomes (SLOs) (Table 2), and from SLOs to Program Learning Outcomes (PLOs), which reflect Engineers Australia Stage 1 Competency Standards (Table 1).

Process Overview:

1. **Setting Outcomes.** Program-level outcomes were derived from Engineers Australia Stage 1 Competencies and UNSW graduate attributes. Specialisation Learning Outcomes articulated discipline-specific capabilities, and CLOs were designed to progressively build these competencies through individual courses.
2. **Alignment and Mapping.** Each course underwent curriculum mapping to confirm its CLOs contributed directly to SLOs and PLOs. Tables 1 and 2 demonstrate these relationships.
3. **Assessment Integration.** Assessment tasks are explicitly linked to CLOs with grading criteria designed to validate achievement of intended learning outcomes. This ensures that evidence of student performance support assurance of learning at the program level.
4. **Review and Verification.** Achievement of outcomes will be verified through:
    a. **Annual course reviews**, using assessment data and student feedback.
    b. **Program-level monitoring**, aggregating evidence from multiple courses to confirm attainment of SLOs and PLOs.
    c. **Comprehensive reviews every five years**, incorporating stakeholder input and benchmarking against national and international standards.
5. **Continuous Improvement.** Findings from mapping and review informed curriculum adjustments, ensuring ongoing alignment with accreditation requirements and industry expectations.

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. Use methods, tools and ideas from mathematics, physics, chemistry, biology and computer science to solve complex biomedical engineering problems, employing both analytical and computational tools in a real-world context.	x	x	x													
2. Evaluate current research findings and industry best practices to address multifaceted problems in Biomedical Engineering, considering both technological advancements and clinical implications.				x	x	x										
3. Design and implement innovative biomedical technologies and systems, ensuring they meet safety, effectiveness and efficacy requirements using critical assessment methods and standards.							x	x	x							
4. Apply ethical and professional judgement in the practice of Biomedical Engineering for sustainable and responsible solutions in healthcare.											x					
5. Apply communication strategies to engage effectively with diverse audiences within and beyond the Biomedical Engineering field.												x				
6. Implement project management tools and processes to the planning and execution of project work to a professional standard.										x				x		
7. Evaluate personal development of learning through reflection on feedback to enhance the quality and impact of work.													x		x	
8. Collaborate effectively with others to achieve a common objective or fulfil a common project and reflect critically on the process and the outcomes.															x	x

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

Course code	1. Use methods, tools and ideas from mathematics, physics, chemistry, biology and computer science to solve complex biomedical engineering problems, employing both analytical and computational tools in a real-world context.	2. Evaluate current research findings and industry best practices to address multifaceted problems in Biomedical Engineering, considering both technological advancements and clinical implications.	3. Design and implement innovative biomedical technologies and systems, ensuring they meet safety, effectiveness and efficacy requirements using critical assessment methods and standards.	4. Apply ethical and professional judgement in the practice of Biomedical Engineering for sustainable and responsible solutions in healthcare.	5. Apply communication strategies to engage effectively with diverse audiences within and beyond the Biomedical Engineering field.	6. Implement project management tools and processes to the planning and execution of project work to a professional standard.	7. Evaluate personal development of learning through reflection on feedback to enhance the quality and impact of work.2
Level 1 Core Courses							
BIOM1500	Developed		no alignment	Introduced	Introduced		Introduced
MATS1101	Introduced		Introduced				
DESN1000	Introduced		Introduced		Introduced	Introduced	
ENGG1811	Introduced		Introduced				
ELEC1111	Introduced	Introduced	Introduced				

MATH1131	Developed		Introduced		Introduced		
MATH1141	Developed		Introduced		Introduced		
MATH1231	Developed		Developed		Developed		
MATH1241	Developed		Developed		Developed		
PHYS1121	Introduced				Introduced	Introduced	
PHYS1131	Introduced				Introduced		
Level 2 Core courses							
DESN2000	Developed	no alignment	Developed		Developed	Developed	Introduced
BIOM2300	Developed	Introduced	no alignment	no alignment	no alignment	no alignment	Introduced
BIOM2600	Developed	Introduced	Introduced	Introduced	Developed		no alignment
BIOM2601	Developed	Introduced	Introduced	Developed	Developed		no alignment
BIOM2700	Developed		Developed	Developed	Developed		Developed
MATH2089	Developed	no alignment	Introduced	Introduced	no alignment		
PHSL2121	Introduced	no alignment			no alignment		
MATH2018	Developed	no alignment	Introduced		Developed		
Level 3 Core courses							
BIOM3000		Developed	Developed	Developed		Developed	
BIOM3001	Developed	no alignment	Developed	Developed	no alignment	no alignment	Developed
BIOM3300	Developed	Developed	Developed		no alignment	no alignment	no alignment
BIOM3500	Developed	Developed	Developed		Developed		Proficient
BIOM3600	Proficient	Proficient	Proficient				
Level 4 Core courses							
BIOM4951	Proficient	Proficient	Proficient	Proficient	Proficient	Proficient	Proficient
BIOM4952	Proficient	Proficient	Proficient	Proficient	Proficient	Proficient	Proficient
BIOM4953	Proficient	Proficient	Proficient	Proficient	Proficient	Proficient	Proficient
BIOM9410		Proficient	Proficient	Proficient	Proficient		
BIOM9711	Proficient		Proficient				
Discipline Electives							
BIOM9027	Developed		Proficient	Developed	Developed		
BIOM9311	Proficient		Developed				
BIOM9333	Proficient	Proficient	Developed		Proficient		
BIOM9450	Proficient		Proficient				

BIOM9551	Developed	Developed	Proficient	Developed	Proficient	Developed	Proficient
BIOM9621	Proficient		Proficient			Developed	
BIOM9660	Developed	Developed	Developed	Introduced	Developed		
BIOM9701	Developed		Developed				
BIOM9910		Developed			Proficient		Proficient
BIOM9920	Proficient	Proficient	Developed	Developed	Proficient	Developed	
CEIC6712	Developed	Introduced	Introduced		Developed		
MATS4019	Developed	Developed	Developed		Developed		
BIOM9811	Proficient	Developed	Developed	Developed	Developed		

7. Assessments

The program adopted a structured approach to assessment to ensure validity, integrity, and alignment with Engineers Australia Stage 1 Competency Standards. The design of assessment tasks and grading schema was intended to verify achievement of course-level outcomes (CLOs), specialisation learning outcomes (SLOs), and program-level outcomes (PLOs).

Key Features of the Assessment Approach:

- **Alignment and Verification.** Each assessment task was mapped to CLOs, which in turn aligned with SLOs and PLOs. This ensures that evidence of student performance contributes to verifying graduate capabilities at the program level.
- **Diversity of Assessment Types.** As shown in Figures 1–3, the program incorporates a balanced mix of assessment types across the specialisation, core courses, and electives. This included written reports, design projects, laboratory work, presentations, and examinations, providing multiple opportunities for students to demonstrate technical and professional competencies.
- **Development of Reflective Practice.** Reflective activities are embedded strategically throughout the specialisation using a coordinated, scaffolded approach. These activities enable students to critically evaluate their learning and professional growth at key stages of their academic journey, developing self-awareness and adaptability. By integrating reflection throughout the specialisation, the program prepares students for lifelong learning and continuous professional development.
- **Critical Review, Self and Peer Assessment.** Group projects incorporate peer evaluation and self-assessment components to promote accountability, teamwork, and constructive feedback skills.
- **Approach to Generative AI.** The program adheres to UNSW's guidelines for the responsible use of generative AI. Course convenors clearly communicate expectations for AI use within each course, tailoring permissions to the nature of the activity and its intended learning outcomes. This approach safeguards academic integrity while enabling students to engage with AI tools in a transparent, ethical manner that supports assurance of learning.
- **Assessment Integrity.** Measures such as plagiarism detection, demonstrations, and staged submissions are implemented to uphold integrity and authenticity of student work.
- **Grading Schema.** Grading criteria are designed to reflect achievement of intended learning outcomes, with rubrics providing clarity on expectations.

Figures 1–3 demonstrate the distribution of assessment types across the specialisation, core courses, and electives. These visualisations confirm a deliberate balance between formative and summative tasks, practical and theoretical assessments, and individual and collaborative work, supporting comprehensive development of graduate capabilities.

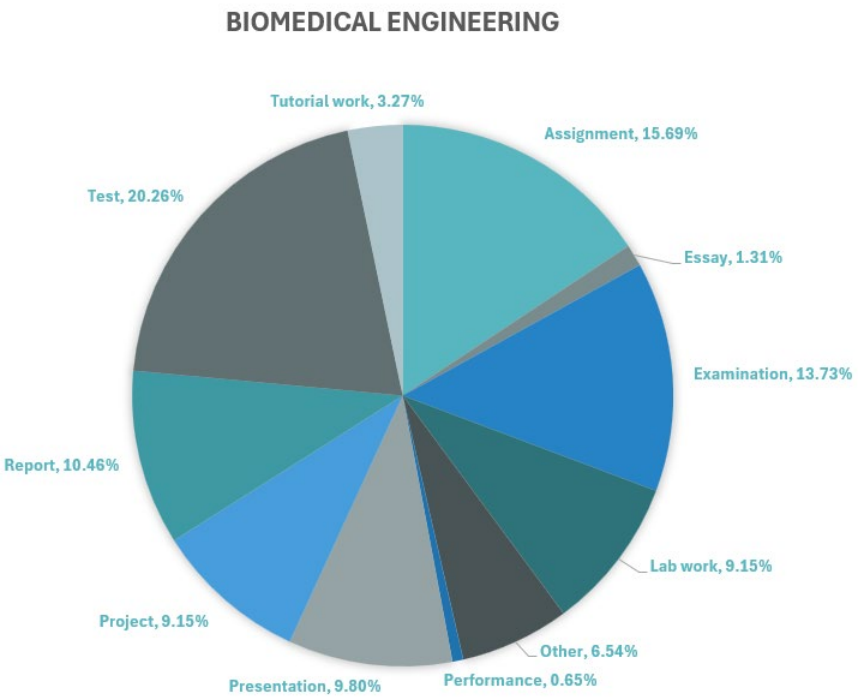

Figure 1 Percentage of assessment types used within the specialisation.

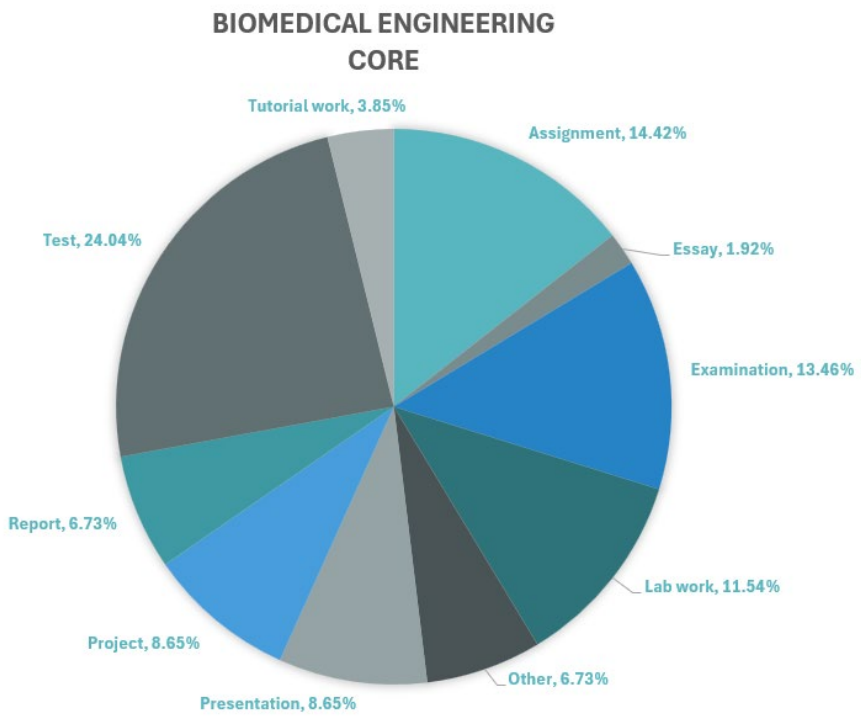

Figure 2 Percentage of assessment types used within the core of the specialisation.

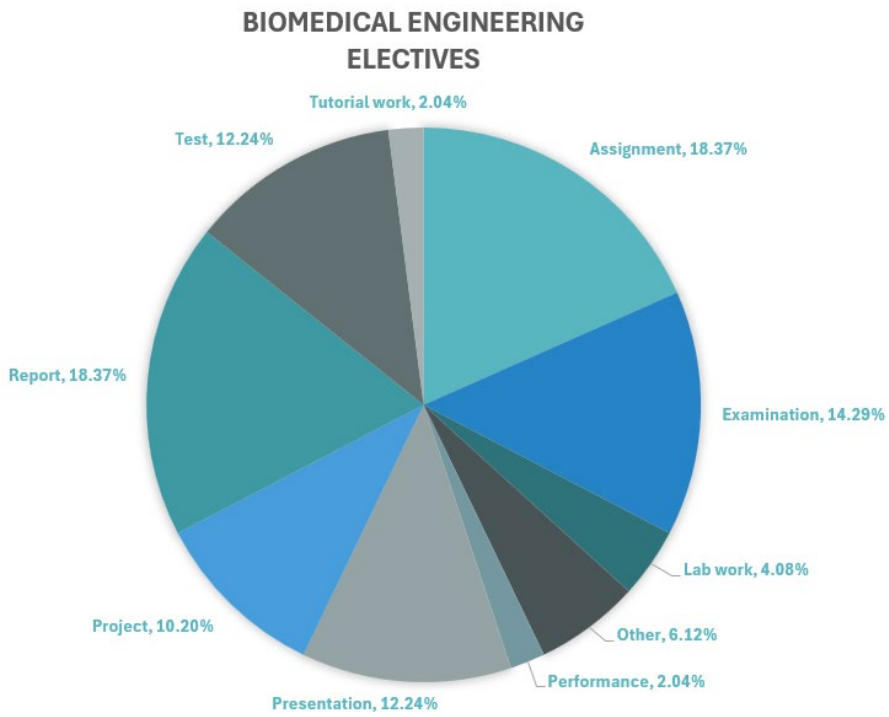

Figure 3 Percentage of assessment types used within the electives of the specialisation.

8. Specialisation Progression Plan

The School of Biomedical Engineering will monitor student progression and capability development through structured processes aligned with Faculty and University policies and procedures.

- **Curriculum Mapping and Assurance of Learning**. Each course is mapped to Engineers Australia Stage 1 Competencies and program learning outcomes. Assessment data will be reviewed annually to verify achievement of these outcomes.
- **Progression Monitoring**. Student progression will be tracked through academic performance indicators (e.g., WAM, academic standing, success) and flagged for intervention where necessary.
- **Integration with myPlan**. Students will be encouraged to use myPlan, UNSW's online progression checker and study planner, to plan their courses and track progress in real time. myPlan will provide visibility of prerequisites, historical term offerings, and recommended pathways, supporting informed decision-making and timely completion.

- **Review and Feedback Loops**. Aggregated assessment results and myExperience feedback will inform curriculum adjustments. Identified gaps in capability development will trigger targeted improvements in course design or support resources.
- **Integration with Program Reviews**. Findings from progression monitoring will feed into annual program monitoring and five-year comprehensive reviews, ensuring continuous alignment with accreditation standards and industry expectations.

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