UNSW Engineering

Education Specification

1. Program Overview

Program Title: Bachelor of Engineering (Honours)

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

Engineering Discipline: Computer Engineering

Computer Engineering encompasses the structured design and integration of hardware and software components as part of a larger system. Not only do personal computers as well as datacentre systems fall under this category but so do embedded systems such as those found in smart televisions and phones, vehicle electronics and communication networks. The challenge to the engineer in this field is to design these systems not just for functionality but also for maximal impact and efficiency, and to trade off competing factors through engineering, scientific and mathematical principles.

To meet these challenges, the specialisation emphasizes the building of knowledge in core computing, mathematics, physics, electronics, and design in the first two years. During the second and third years, students are guided towards applying the knowledge they have gained to the design and implementation of digital circuits, processors, operating systems and embedded systems. In the final year, more freedom is offered to practice systems design and implementation in teams, consider the ethical and professional implications of their work and to develop their research skills through their final year projects. The Computer Engineering specialisation at UNSW blends industry relevant theory and practice throughout the four-year program.

2. Career Alignment

Firmware Engineer e.g. software support for hardware systems (Morse Micro, Millibeam, Arista, Audinate, ResMed).

Hardware Engineer e.g. digital design for signal processing, network packet processing, smart transport systems, logistics, medical devices, banking and finance.

Software Engineer e.g. involving integration of distributed edge devices in hospitals, electricity distribution, water distribution, banking, retail, telecommunications (Energy Aus/AGL/Origin, Sydney Water, ATM networks, POS networks, large scale retailers like supermarkets, service stations, toll networks, public transport networks, airports).

CRICOS Provider Code 00098G

3. Specialisation Framework

The COMPBH specialisation learning outcomes were developed by the COMPBH Director of Studies in conjunction with CSE's Deputy Head of School (education) and considered/refined by both the CSE Education Committee and the Industry Advisory Board.

The core computing and mathematics courses give students a solid foundation on which to build subsequent study in the more advanced aspects of designing and implementing hardware and software systems. Alongside their computing studies, Computer Engineering students study a substantial number of physics, electrical and electronics courses; such knowledge is clearly required in dealing with computers at the device level and integrating them into their environment.

These disciplines (computing, circuits, electronics, physics), along with discipline-specific knowledge gained in digital design, computer architecture and operating systems culminate in a series of project courses (DESN2000, COMP3601, COMP4601), where students undertake design work involving processors, programmable logic, and their interaction with real-world devices in embedded systems. These courses are project-based, which develops students' skills in teamwork and management of engineering projects. Professionalism is further developed in the Ethics and Professional Issues course (COMP4920).

The 4th-year thesis allows students to explore the application of computing to solving computer engineering problems in more depth. Students get to review literature and carry out analysis, design, and implementation work, to further consolidate what they learned in the previous three years.

Refer to the SLO/PLO mapping in Section 6 to gain an overview of how the Computer Engineering specialisation learning outcomes map to the BE program level outcomes, which correspond to the EA Stage 1 Competencies. The curriculum mapping further details how individual courses contribute to the achievement of the SLOs and in turn the PLOs.

4. Continuous Improvement

The program design is informed primarily by the academics in the Computer Engineering Teaching Cluster (A/P Oliver Diessel, A/P Tara Hamilton, A/P Haibo Zhang, Dr Hui (Annie) Guo, Dr Hammond Pearce and Dr Hasindu Gamaarachchi). The academics draw upon their individual research specialties, experience, industry and academic networks, exchange visits, as well as their engagement with publishing, journal & conference reviewing, conference and workshop attendance to inspire the ongoing development of the program.

External sources of input come from the members of the School's Education Committee, members of the Industry Advisory Board, relationships with academics across the University, but particularly from Electrical Engineering, and readings of the journals and magazines of relevant professional societies (IEEE, ACM), e.g. the daily ACM TechNews digest, IEEE Transactions in Reconfigurable Technology and Systems, International Conference in Field-Programmable Technology, Design Automation Conference, International Symposium on Field-Programmable Custom Computing Machines, DAC (Design Automation Conference), ASP-DAC (Asia Pacific Design Automation Conference), IEEE/ACM International Symposium on Microarchitecture (MICRO) and Design, Automation & Test in Europe Conference & Exhibition (DATE).

An understanding of national and international developments not just in technology but in society more broadly through news media helps to inform developments as well.

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

Specialisation learning outcomes (SLOs) are set by the teaching cluster responsible for providing the specialized core Computer Engineering courses and vetted/approved by the CSE Education Committee (EdCom). The SLOs are mapped to the individual courses comprising the specialisation, each of which has a set of specified course learning outcomes (CLOs) set during course proposal and also vetted/approved by the EdCom. These are reviewed and proposed for modification to EdCom by course convenors/Director of Studies as necessary to better align the curriculum with learning in other courses. Course and specialisation adjustments are recorded in ECLIPS, the university's program and course information management system, from where their approval at Faculty and University level is managed. Verification of attainment is up to course convenors, who determine the number, type, and style of assessments that best suit the specific course learning outcomes. In doing so, convenors are constrained by university rules on the weighting and distribution of marks for assessments within a course.

On subsequent pages we map the Computer Engineering SLOs to the Engineering (Hons) program level outcomes and show how the Computer Engineering courses develop each of the SLOs.

Table 1. Mapping of the Computer Engineering 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. Characterise, formulate, and solve problems in Computer Engineering using current techniques, and tools.			x	x	x		x	x	x	x						
2. Apply mathematical, scientific, and engineering principles to the effective analysis, design, construction, testing and maintenance of computer systems, components, and processes.	x	x		x			x	x		x						
3. Appreciate the importance of physical, economic and time constraints in the design, construction and maintenance of computer systems, components, and processes.			x	x	x	x	x	x	x	x						
4. Evaluate the societal and professional implications of engineering decisions.					x	x					x				x	
5. Communicate effectively to all audiences whether practicing independently or in multidisciplinary teams.												x		x	x	x
6. Recognise the need for, and engage in, life-long learning.													x		x	

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

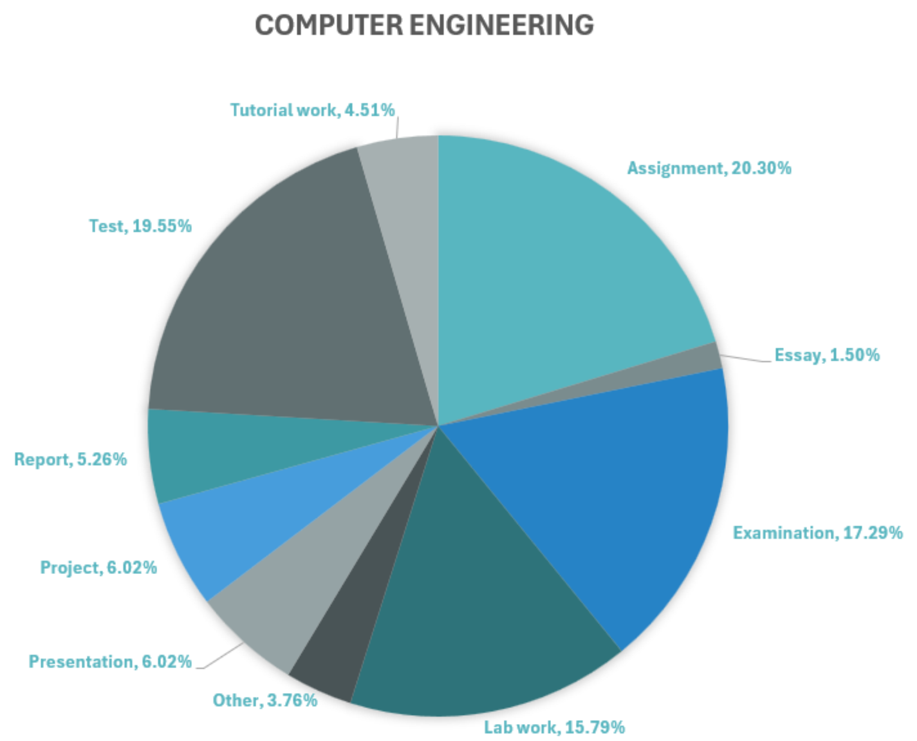
	1. Characterise, formulate, and solve problems in Computer Engineering using current techniques, and tools.	**2. Apply mathematical, scientific, and engineering principles to the effective analysis, design, construction, testing and maintenance of computer systems, components, and processes.**	**3. Appreciate the importance of physical, economic and time constraints in the design, construction and maintenance of computer systems, components, and processes.**	**4. Evaluate the societal and professional implications of engineering decisions.**	**5. Communicate effectively to all audiences whether practicing independently or in multidisciplinary teams.**	**6. Recognise the need for, and engage in, life-long learning.**
Level 1 Core						
COMP1511	Introduced	Introduced	Introduced			
COMP1521	Introduced	Introduced	Introduced		Introduced	
COMP1531	Introduced	Introduced	Introduced		Introduced	
DESN1000	Introduced	Introduced			Introduced	
ELEC1111	Introduced	Introduced				
MATH1081		Introduced			Introduced	

MATH1131	Introduced	Introduced			Introduced	
MATH1141	Introduced	Introduced			Introduced	
MATH1231	Introduced	Introduced			Introduced	
MATH1241	Introduced	Introduced			Introduced	
PHYS1121	Introduced	Introduced			Introduced	
PHYS1131	Introduced	Introduced			Introduced	
PHYS1221	Introduced	Introduced			Introduced	
PHYS1231	Introduced	Introduced			Introduced	
Level 2 Core						
COMP2521	Developed	Developed	Developed			
COMP2511						
DESN2000	Developed				Developed	
ELEC2133	Developed	Developed			Developed	
ELEC2134	Developed	Developed			Developed	
MATH2099	Developed	Developed				
Level 3 Core						
COMP3211	Developed		Developed		Developed	Developed
COMP3222	Introduced	Introduced	Introduced			
COMP3231	Developed		Developed			
COMP3601	Proficient	Proficient	Proficient	Introduced	Proficient	
Level 4 Core						
COMP4601	Proficient	Proficient	Proficient		Proficient	Proficient
COMP4920				Introduced	Proficient	Developed
COMP4951	Proficient	Proficient			Proficient	Proficient
COMP4952	Proficient	Proficient			Proficient	Proficient
COMP4953	Proficient	Proficient			Proficient	Proficient
Discipline Electives						
COMP6420	Proficient		Proficient	Developed	Proficient	Proficient
ELEC3106	Proficient	Proficient				
ELEC3114		Developed				
ELEC4602	Proficient	Proficient	Proficient			
ENGG2600	Developed	Developed			Introduced	Introduced

ENGG3060	Developed			Developed	Developed	
ENGG3600	Developed	Developed			Developed	Developed
ENGG4600	Proficient	Proficient			Proficient	Proficient
TELE4642	Proficient	Proficient				

7. Assessments

Early courses emphasise assignment work, lab work and exams, to ensure that students have developed solid foundations. The later courses emphasise team-based project work, to develop skills in solving larger problems in collaboration with other people. While the 4th-year thesis is usually an individual project, it requires close interaction with the supervisor as a mentor, and presentations to the supervisor and their peers.



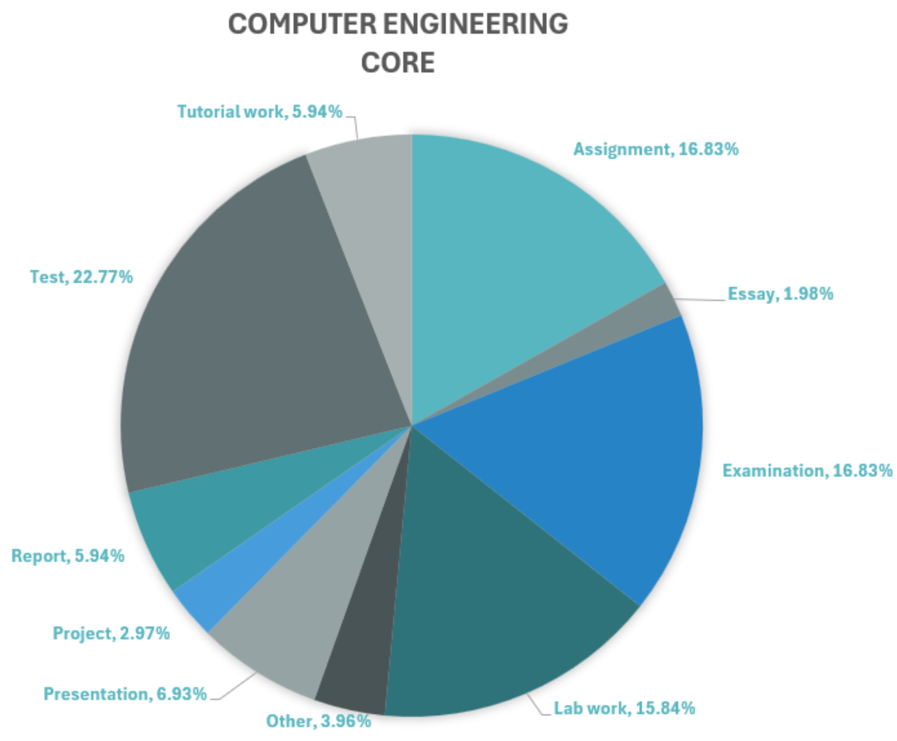


Figure 1. Percentage of assessment types used within the specialisation

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

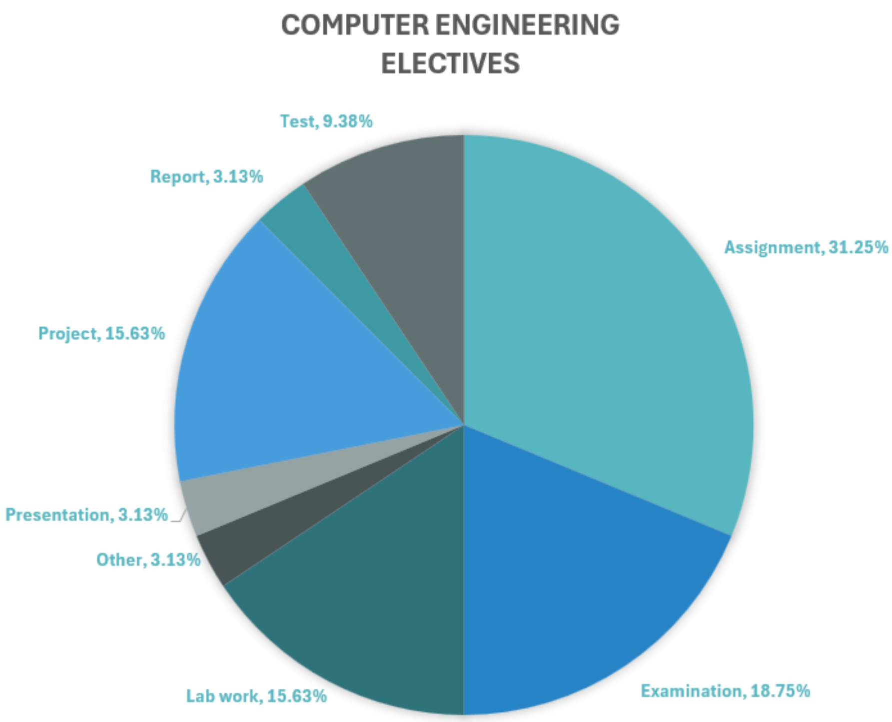


Figure 3. Percentage of assessment types used within the electives of the specialisation

8. Specialisation Progression Plan

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