

ELEC40002								
Analysis and Design of Circuits								
Explain the basic physics underlying the operation of the following electronic components: resistor, capacitor, inductor, diode, transistor	Perform DC analysis of circuits containing combinations of the above components to establish the nodal voltages and branch currents	Perform AC analysis of circuits containing combinations of the above components, using small-signal equivalent models to linearise any non-linear elements	Apply the operation of simple transistor level circuits including amplifier stages and logic gates	Analyse basic opamp circuits containing idealised opamps and passive components	Apply the concept of a transfer function and derive the transfer functions for a range of standard filter circuits	Analyse the transient behaviour of 1st order RC and RL networks	Use SPICE to simulate the behaviour of the circuits you have studied	Appreciate where and how the circuits you have studied are applied in real engineering applications

ELEC40003					
Digital Electronics and Computer Architecture					
design significant synchronous sequential digital circuits using registers and combinational logic	design simple two's complement addition and subtraction digital circuits, with correct use of carry and overflow	use digital blocks: RAMs, ROMs, registers, adders, multiplexers and state machines to design and analyse the operation of simple pipelined RISC computer systems	model the operation of machine code instructions on a CPU at register-transfer level, and manipulate data using different numeric representations	write programs for arithmetic operations, manipulating bit fields within words, accessing memory, and calling subroutines	implement I/O in embedded computer systems using polling

ELEC40004						
Programming for Engineers						
use the fundamental components of imperative programming in terms of control-flow structures and variables	design and implement a C++ program that communicates using file-based IO in a CLI environment	verify the correct behaviour of programs	diagnose and fix incorrect behaviour and crashes	select and use data-structures from the STL according to needed performance and functionality	use APIs, encapsulation, and abstraction to manage software complexity	design object-oriented data-structures to capture real-world problems

ELEC40006					
Electronics Design Project					
Capture and analyse a set of high-level requirements to produce a set of design specifications	Apply theoretical principles and laboratory skills to design, build and test a solution to an engineering design problem, within practical constraints	Integrate analogue, digital and software theory and design techniques into a functioning system	Organise workload and manage time by functioning as an engineering team and decomposing the design challenge into subsystems	Formulate and implement a test plan to evaluate a design against its specifications	Communicate process and outcomes to stakeholders using various forms of communication (reports, presentations, reviews, etc.)

ELEC40009					
Topics in Electrical Engineering					
Describe waves as information carriers	Describe how waves propagate in free space and transmission lines	Apply mathematical tools to investigate signals in the frequency domain	Explain the need for modulation techniques to transmit a signal and identify the basic hardware components to achieve modulation and demodulation	Describe the transport processes in a pn diode and extrapolate this knowledge to its use as a solar cell	Employ laboratory skills to characterise solar cells

ELEC40010					
Mathematics 1A					
apply the techniques of single-variable calculus to obtain solutions to a wide variety of applications of differentiation and integration	utilize the concepts of complex number, functions, limits and series to perform, among others, Fourier Analysis of periodic and non-periodic functions	use the techniques of vector and linear algebra to analyze and apply the correct solution method in a range of problems involving vectors, matrices and systems of equations	identify and apply the correct approach to solving different types of first- and second-order ordinary differential equations	explain and apply the concepts and techniques of multivariable calculus and tackle problems in their appropriate context	explain where and how the mathematical concepts are applied in engineering problems in electromagnetism, signal processing and communications