

# ELECTRICAL AND ELECTRONIC ENG. (ELEC)

## ELEC 1001 Digital Systems 1 (10 Credit Points)

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec1001/>) **Legacy Code:** 300018

This subject provides students with a solid background in digital logic design which is foundational to the fields of electrical and computer engineering. Digital logic design involves building electronic components and hardware, such as circuit boards and microchip processors. Students are first introduced to the fundamentals of digital logic, basic logic devices and Boolean algebra. This is followed by analysis and design of combinational and sequential logic circuits.

**Level:** Undergraduate Level 1 subject

**Equivalent Subjects:** ELEC 1002 - Digital Systems 1 (WSTC AssocD)

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

## ELEC 1002 Digital Systems 1 (WSTC AssocD) (10 Credit Points)

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec1002/>) **Legacy Code:** 700240

This subject provides students with a solid background in digital logic design which is foundational to the fields of electrical and computer engineering. Digital logic design involves building electronic components and hardware, such as circuit boards and microchip processors. Students are first introduced to the fundamentals of digital logic, basic logic devices and Boolean algebra. This is followed by analysis and design of combinational and sequential logic circuits. Offerings of alternate subjects are dependent on there being sufficient student enrolment numbers. If enrolments are low, the College may cancel delivery of the alternate subject.

**Level:** Undergraduate Level 1 subject

**Pre-requisite(s):** MATH 1010

**Equivalent Subjects:** ELEC 1001 - Digital Systems 1

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

## ELEC 1003 Electrical Fundamentals (10 Credit Points)

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec1003/>) **Legacy Code:** 300021

This subject introduces essential electrical engineering concepts that provide students with the basic requirements for analysing, designing, building, and testing simple engineering systems. Students use techniques for analysing different types of circuits based on their knowledge of electrical theory and the characteristics of power, electrical energy, signals, and electrical circuit components. Students have practical activities including conducting experiments in learning how electrical systems work. Students are introduced to Electrical Machines and Renewable Energy systems for a fundamental understanding.

**Level:** Undergraduate Level 1 subject

**Equivalent Subjects:** ELEC 1005 Electrical Fundamentals (WSTC)

ELEC 1004 Electrical Fundamentals (WSTC Assoc Deg)

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

## ELEC 1004 Electrical Fundamentals (WSTC AssocD) (10 Credit Points)

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec1004/>) **Legacy Code:** 700104

The objective of this subject is to introduce to the student a number of concepts within electrical engineering. These include basic definitions of charge, current, potential difference, power; electric circuits and basic laws such as Ohm's and Kirchoff's Laws; Thevenin, Norton's and the maximum power theorems; electromagnetism and the associated fundamental laws; capacitor and resistor circuits and time constants; an introduction to Electronics; communication waves; Logic gates and number systems; and an introduction to Electrical Machines and Renewable Energy systems. Basic principles are explained and applied to a range of typical electrical circuits and devices. These foundations provide students with the basic requirements for a career in engineering where the concepts can be developed or applied to more complex engineering systems.

**Level:** Undergraduate Level 1 subject

**Equivalent Subjects:** ELEC 1003 - Electrical Fundamentals ELEC 1005 - Electrical Fundamentals (WSTC)

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

## ELEC 1005 Electrical Fundamentals (WSTC) (10 Credit Points)

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec1005/>) **Legacy Code:** 700024

The objective of this subject is to introduce to the student a number of concepts within electrical engineering. These include the basic definitions of charge, current, potential difference, power; electric circuits and basic laws such as Ohm's and Kirchoff's Laws; Thevenin, Norton's and the maximum power theorems; electromagnetism and the associated fundamental laws; capacitor and resistor circuits and time constants; an introduction to Electronics; communication waves; Logic gates and number systems; and an introduction to Electrical Machines and Renewable Energy systems. Basic principles are explained and applied to a range of typical electrical circuits and devices. These foundations provide students with the basic requirements for a career in engineering where the concepts can be developed or applied to more complex engineering systems.

**Level:** Undergraduate Level 1 subject

**Pre-requisite(s):** Students enrolled in 6033 Diploma in Engineering Bachelor of Engineering Studies or 7034 Diploma in Engineering or 7066 Diploma in Engineering Extended must pass PHYS 0003 Foundation Physics 2 before enrolling in this unit

**Equivalent Subjects:** ELEC 1003 - Electrical Fundamentals ELEC 1004 - Electrical Fundamentals (WSTC Assoc Deg)

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

## ELEC 1006 Engineering Computing (10 Credit Points)

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec1006/>) **Legacy Code:** 300027

Engineering computing is an introduction to using computation to solve real problems. The subject also aims to instil sound principles of program design that can be utilised in many subjects throughout the students' course. The basic elements and structures of a high level language are taught. Students are exposed to numerous engineering problems and are encouraged to implement solutions using an algorithmic approach.

**Level:** Undergraduate Level 1 subject

**Equivalent Subjects:** ELEC 1008 Engineering Computing (WSTC)

ELEC 1007 Engineering Computing (WSTC Assoc Deg)

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 1007 Engineering Computing (WSTC AssocD) (10 Credit Points)**  
**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec1007/>) **Legacy Code:** 700106

Engineering computing is an introduction to using computation to solve real problems. The subject also aims to instil sound principles of program design that can be utilised in many subjects throughout the students' course. The basic elements and structures of a high level language are taught. Students are exposed to numerous engineering problems and are encouraged to implement solutions using an algorithmic approach.

**Level:** Undergraduate Level 1 subject

**Equivalent Subjects:** ELEC 1006 - Engineering Computing ELEC 1008 - Engineering Computing (WSTC)

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 1008 Engineering Computing (WSTC) (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec1008/>) **Legacy Code:** 700018

Engineering Computing is an introduction to using computation to solve real problems. The subject also aims to instil sound principles of program design that can be utilized in many subjects throughout the students' course. The basic elements and structures of a high level language are taught. Students are exposed to numerous engineering problems and are encouraged to implement solutions using an algorithmic approach.

**Level:** Undergraduate Level 1 subject

**Pre-requisite(s):** Students enrolled in 7066 or 7162 Diploma in Engineering Extended or 7082 Bachelor of Engineering Extended (WSTC First Year Program) must pass COMP 0001 Introductory Programming (WSTC Prep) before enrolling in this unit

**Co-requisite(s):** Before taking ELEC 1008 students in program 6033 must have passed or be registered in MATH 0008 PHYS 0003 and GEDU 0008

**Equivalent Subjects:** ELEC 1006 - Engineering Computing ELEC 1007 - Engineering Computing (WSTC Assoc Deg)

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 1009 Electrical Circuit Fundamentals (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec1009/>) **Legacy Code:** 301336

This subject will be offered at Engineering Innovation Hub - Hassall St, Parramatta campus. This subject is an introductory unit in Electrical Engineering, which provides an introduction to electrical circuits and fundamental electrical elements as well as the technical skills to analyse such circuits. It is suitable for students pursuing further studies in Electrical Engineering such as Power and Energy, Telecommunications, Control, Instrumentation, as well as other related engineering disciplines including Computer Science and Engineering. In the practical section, this course provides hands-on experience in building and testing circuits. This subject is presented in such a way that students who have taken it are capable of building and analysing some practical, useful devices afterwards.

**Level:** Undergraduate Level 1 subject

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 1011 Engineering Computing (Block) (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec1011/>) **Legacy Code:** 500064

Engineering Computing is an introduction to using computation to solve real problems. The subject also aims to instil sound principles of program design that can be utilized in many subjects throughout the students' course. The basic elements and structures of a high level language are taught. Students are exposed to numerous engineering problems and are encouraged to implement solutions using an algorithmic approach.

**Level:** Undergraduate Level 1 subject

**Equivalent Subjects:** ELEC 1006 Engineering Computing ELEC 1007 Engineering Computing (WSTC AssocD) ELEC 1008 Engineering Computing (WSTC)

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 1012 Electrical Fundamentals (Block) (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec1012/>)

This subject introduces essential electrical engineering concepts that provide students with the basic requirements for analysing, designing, building, and testing simple engineering systems. Students use techniques for analysing different types of circuits based on their knowledge of electrical theory and the characteristics of power, electrical energy, signals, and electrical circuit components. Students have practical activities including conducting experiments in learning how electrical systems work. Students are introduced to Electrical Machines and Renewable Energy systems for a fundamental understanding.

**Level:** Undergraduate Level 1 subject

**Equivalent Subjects:** ELEC 1003 (300021) Electrical Fundamentals ELEC 1005 (700024) Electrical Fundamentals (WSTC) ELEC 1004 (700104) Electrical Fundamentals (WSTC AssocD)

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 2001 Circuit Theory (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec2001/>) **Legacy Code:** 300005

This subject aims to equip the student with the tools needed for the design and analysis of electrical and electronic circuits. It also introduces various techniques of circuit analysis, mutual coupling, frequency response and two-port networks.

**Level:** Undergraduate Level 2 subject

**Pre-requisite(s):** ELEC 1003 AND MATH 1019 OR MATH 1035

**Equivalent Subjects:** ELEC 2002 - Circuit Theory (WSTC AssocD)

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 2002 Circuit Theory (WSTC AssocD) (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec2002/>) **Legacy Code:** 700243

This subject aims to equip the student with the tools needed for the design and analysis of electrical and electronic circuits. It also introduces various techniques of circuit analysis, convolution, mutual coupling, frequency response and two-ports loops. Offerings of alternate subjects are dependent on there being sufficient student enrolment numbers. If enrolments are low, the College may cancel delivery of the alternate subject.

**Level:** Undergraduate Level 2 subject

**Pre-requisite(s):** ELEC 1004 and MATH 1020

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 2004 Electronics (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec2004/>) **Legacy Code:** 300025

This subject further develops skills in the analysis, design, practical implementation and testing of the main analogue electronic circuits. Topics covered are: semiconductor diodes and their applications, Bipolar Junction Transistors (BJT), Field Effect Transistors (FET), analysis of BJT and FET, design of discrete operational amplifiers, and operational amplifier characteristics and circuit configurations.

**Level:** Undergraduate Level 2 subject

**Pre-requisite(s):** ELEC 1003 OR ELEC 1009

**Equivalent Subjects:** ELEC 2005 - Electronics (WSTC AssocD)

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 2005 Electronics (WSTC AssocD) (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec2005/>) **Legacy Code:** 700242

This subject further develops skills in the analysis, design, practical implementation and testing of the main analogue electronic circuits. Topics covered are: semiconductor diodes and their applications, Bipolar Junction Transistors (BJT), Field Effect Transistors (FET), analysis of BJT and FET, design of discrete operational amplifiers and operational amplifier characteristics and circuit configurations. Offerings of alternate subjects are dependent on there being sufficient student enrolment numbers. If enrolments are low, the College may cancel delivery of the alternate subject.

**Level:** Undergraduate Level 2 subject

**Pre-requisite(s):** ELEC 1004

**Equivalent Subjects:** ELEC 2004 - Electronics

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 2006 Engineering Electromagnetics (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec2006/>) **Legacy Code:** 300481

This subject introduces Maxwell's equations in integral and differential form and their application to basic theory and application of electromagnetic structures, wave propagation, guides waves, antennas and Electromagnetic compatibility.

**Level:** Undergraduate Level 2 subject

**Pre-requisite(s):** MATH 1019 AND ENGR 1011 OR ENGR 1028

**Equivalent Subjects:** ELEC 2003 - Electromagnetics LGYA 5725 - Electromagnetic Compatibility

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 2007 Engineering Visualization (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec2007/>) **Legacy Code:** 300029

This subject aims to provide a comprehensive introduction to fundamental concepts and algorithms in engineering visualization. Topics covered include visualization hardware, scan conversion of geometric primitives, 2D and 3D transformations, 3D viewing and projection, hidden surface removal, solid modelling, illumination models and image manipulation.

**Level:** Undergraduate Level 2 subject

**Pre-requisite(s):** Students must have passed ELEC 1006 Engineering Computing and either ELEC 2009 Microprocessor Systems or ELEC 2008 Microcontrollers and PLCs

**Equivalent Subjects:** LGYB 0688 - Computer Graphics

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 2008 Microcontrollers and PLCs (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec2008/>) **Legacy Code:** 300044

Through completion of an applied project students will develop an understanding of the hardware, architecture and the assembly language of microcontrollers in addition to the control of a mechanical system with a programmable logic controller (PLC). The subject looks at the applications of timers, interrupts and serial ports. Furthermore, the general approach in designing a microcontroller in mechanical systems will be studied. Students will use an Omron PLC to control a factory represented by four pneumatic cylinders. After covering the Ladder Logic programming language, they will move on to cover sequential programming and numerical manipulation using PLCs.

**Level:** Undergraduate Level 2 subject

**Pre-requisite(s):** ELEC 2004 OR

ELEC 1003 OR

ELEC 1009

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 2009 Microprocessor Systems (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec2009/>) **Legacy Code:** 300076

This subject introduces students to the internal structure of microprocessors used in computing systems and their fundamental operations. Topics include assembly language programming, interrupt processing, CPU functions, memory organization, and peripheral programming. The microprocessor and embedded processors are discussed. Students write assembly language programs, debug and create executable files to control microprocessor systems.

**Level:** Undergraduate Level 2 subject

**Pre-requisite(s):** ELEC 1001

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 2010 Power and Machines (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec2010/>) **Legacy Code:** 300052

This subject develops an understanding of the basic concepts of power and machines, including modern power systems and transformers, in addition to the fundamentals of electromechanical energy conversion. Students will also study magnetic circuits, modern permanent magnet materials and their characteristics, and balanced and unbalanced three-phase power systems.

**Level:** Undergraduate Level 2 subject

**Pre-requisite(s):** ELEC 2001 OR

ELEC 2013

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 2011 Signals and Systems (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec2011/>) **Legacy Code:** 300057

This subject aims to develop students' understanding of continuous-time and discrete-time concepts and methods. It covers various signals and their analysis, as encountered in the fields of electrical, computer and telecommunication engineering.

**Level:** Undergraduate Level 2 subject

**Pre-requisite(s):** MATH 1019 AND

ELEC 1003

**Equivalent Subjects:** ELEC 2012 - Signals and Systems (WSTC AssocD)

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 2012 Signals and Systems (WSTC AssocD) (10 Credit Points)**  
**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec2012/>) **Legacy Code:** 700241

This subject aims to develop students understanding of continuous-time and discrete-time concepts and methods. It covers various signals and their analysis, as encountered in the fields of electrical, computer and telecommunication engineering. Offerings of alternate subjects are dependent on there being sufficient student enrolment numbers. If enrolments are low, the College may cancel delivery of the alternate subject.

**Level:** Undergraduate Level 2 subject

**Pre-requisite(s):** MATH 1020 AND ELEC 1004

**Equivalent Subjects:** ELEC 2011 - Signals and Systems

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 2013 Circuits and Signals (10 Credit Points)**  
**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec2013/>) **Legacy Code:** 301352

This subject will be offered at Engineering Innovation Hub - Hassall St, Parramatta campus. This subject covers the fundamentals of circuit, system and signal analysis on which most other courses in the electrical engineering curriculum are built. The subject provides a foundation in frequency domain analysis and in transform methods, as well as significantly extending alternate current analysis, transient analysis and other fundamental circuit analysis tools. Although there is a practical program in the laboratory, the theory aspects of this course are the primary focus.

**Level:** Undergraduate Level 2 subject

**Pre-requisite(s):** ELEC 1009

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 2014 Mathematics for Electrical Engineers 1 (10 Credit Points)**  
**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec2014/>) **Legacy Code:** 301338

This subject will be offered at Engineering Innovation Hub - Hassall St, Parramatta campus. The subject combines two maths components, Vector Calculus and Complex Analysis, both of which incorporate calculus and linear algebra and have many applications to physics, engineering and mathematics, particularly electrical engineering. Vector Calculus involves calculus in two and three dimensions, theory of curves, vector functions and partial derivatives, two- and three-dimensional integration, line integrals and curl and divergence. Complex Analysis extends calculus from real numbers to complex numbers, and develops the theory of analytic functions, complex integration and Cauchy's theorem, series expansions, the residue theorem and applications to real improper integrals and trigonometric integrals.

**Level:** Undergraduate Level 2 subject

**Pre-requisite(s):** MATH 1035

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 2015 Mathematics for Electrical Engineers 2 (10 Credit Points)**  
**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec2015/>) **Legacy Code:** 301339

This subject will be offered at Engineering Innovation Hub - Hassall St, Parramatta campus. This subject builds on two maths components begun in first year engineering, that is linear algebra and statistics. For linear algebra, the aim is to learn and apply the theoretical elements about linear combinations of vectors and matrices amongst other topics to problem sets. For statistics, the aim is to learn the various ways in which random variation arises in engineering contexts and apply methods and models for understanding data and making decisions. In both components, students will expand their skills in analytic thinking.

**Level:** Undergraduate Level 2 subject

**Pre-requisite(s):** MATH 1035

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 2016 Mathematics for Software Engineers (10 Credit Points)**  
**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec2016/>) **Legacy Code:** 301344

This subject will be offered at Engineering Innovation Hub - Hassall St, Parramatta campus. This subject builds on two maths components begun in first year engineering, which are Finite Maths and Statistics. For Finite Maths, the aim is for students to learn about the ideas in Number Theory, the theory of finite fields, cryptography and Algebraic Coding Theory as techniques for organising information and analysing it. For Statistics, the aim is to learn the various ways in which random variation arises in engineering contexts and apply methods and models for understanding data and making decisions. In both components, students will expand their skills in analytic thinking and making sense of data.

**Level:** Undergraduate Level 2 subject

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 2017 Requirements and Design Workshop (10 Credit Points)**  
**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec2017/>) **Legacy Code:** 301346

This subject will be offered at Engineering Innovation Hub - Hassall St, Parramatta campus. This subject has a series of software engineering workshops designed to teach students to work in teams and apply their knowledge to solve real-life problems. These workshops offer students opportunities to concentrate on software requirements analysis and design issues including artefacts produced as well techniques and tools to support this process (brainstorming, problem statements, requirements elicitation, producing design documents and prototyping). In addition, it provides students with some teamwork skills, requirements engineering and design techniques that an engineer would use in the early stages of the development process. The students are also getting experience on different aspects of designing a Web application with a major focus on the front-end.

**Level:** Undergraduate Level 2 subject

**Restrictions:** Please see the Subject Details page for any restrictions for this subject



**ELEC 2018 Systems Modelling and Design (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec2018/>) **Legacy Code:** 301345

This subject will be offered at Engineering Innovation Hub - Hassall St, Parramatta campus. This subject reinforces the understanding of discrete mathematics and the role it plays in computing science and engineering. Students learn how to systematically derive implementations from formal specifications using simple mathematics. Students also learn to develop an understanding of the rules for deriving implementations from specifications. Why do they work? What do we have to prove and how? This is crucial for later industrial software engineering practice.

**Level:** Undergraduate Level 2 subject

**Pre-requisite(s):** MATH 1006 AND ENGR 1045

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 2019 Workshop on Reasoning about Programs (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec2019/>) **Legacy Code:** 301347

This subject will be offered at Engineering Innovation Hub - Hassall St, Parramatta campus. The goal of this subject is to develop skills in writing precise specifications of software programs and to translate these specifications into correct implementations. Further methods for reasoning about programs are introduced, including methods for reasoning about termination, program refinement and data refinement. Students learn to apply these ideas to structure their thinking about programs as well as to build a web application within a project context.

**Level:** Undergraduate Level 2 subject

**Pre-requisite(s):** ELEC 2018

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 3001 Communication Systems (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec3001/>) **Legacy Code:** 300007

This subject will provide a basic introduction to communication systems and techniques. Specific topics covered include energy and power spectral density, amplitude modulation, frequency modulation, pulse modulation, an overview of digital modulation techniques, noise in communication systems and an overview of current telecommunication systems; spread spectrum systems, optical communication systems, radio broadcasting and mobile communication systems.

**Level:** Undergraduate Level 3 subject

**Pre-requisite(s):** ELEC 2011

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 3002 Data Communications (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec3002/>) **Legacy Code:** 300997

This subject is concerned with the principles and topics of fundamental importance to digital data communication, computer communication networks and telecommunications. The lower layers of the protocol structure (physical layer, data link layer and some aspects of the network layer) and the physical medium (hardware and transmission lines) are emphasized. An engineering approach will be taken to provide an insight to transmission and transmission media, communication techniques and transmission efficiency.

**Level:** Undergraduate Level 3 subject

**Pre-requisite(s):** ELEC 2011

**Incompatible Subjects:** ELEC 4001 - Data Networks

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 3003 Digital Signal Processing (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec3003/>) **Legacy Code:** 300069

Students will develop an understanding of the fundamental concepts and principles in digital signal processing by applying the theory learned in their classes to practical exercises. The subject matter includes discrete-time signals and systems, the z-transform, sampling of continuous-time signals, transform analysis of linear time-invariant systems, filter design techniques, structures for discrete-time systems, the discrete Fourier transform and computation of the discrete Fourier transform.

**Level:** Undergraduate Level 3 subject

**Pre-requisite(s):** ELEC 2011 OR ELEC 2013

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 3004 Digital Systems 2 (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec3004/>) **Legacy Code:** 300019

This subject covers modern logic design techniques and the process of creating logic circuits and systems from design specifications to implementation. Topics include logic design techniques for combinational and sequential logic circuits; hardware description language (HDL); logic circuit implementation using an HDL; state-of-the-art logic circuit design tools; and programmable logic devices.

**Level:** Undergraduate Level 3 subject

**Pre-requisite(s):** ELEC 1001

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 3005 Electrical Drives (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec3005/>) **Legacy Code:** 300070

Through practical laboratory exercises students will analyse and evaluate electrical machines and drives. They will examine various types of electrical motors and drive systems, their applications and control. They will also study various types of speed control, starting and braking systems and dynamics.

**Level:** Undergraduate Level 3 subject

**Pre-requisite(s):** ELEC 3006

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 3006 Electrical Machines 1 (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec3006/>) **Legacy Code:** 300071

This subject introduces the fundamental principles of electrical machines, the principles of electromechanical energy conversion and the operation and analysis of Direct Current (DC) generators and motors, induction motors and synchronous machines. Students apply principles and theory to practical exercises to develop their understanding. The subject also introduces various special purpose electrical machines, such as permanent magnet machines, step motors and reluctance machines for an understanding on different types of machines.

**Level:** Undergraduate Level 3 subject

**Pre-requisite(s):** ELEC 2010 or ELEC 3011

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 3008 Instrumentation and Measurement (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec3008/>) **Legacy Code:** 300075

Through practical exercises students will engage with engineering measurement and instrumentation systems. Students determine the most appropriate measurement method and instrument, such as multimeters, digital oscilloscopes and interfacing modules, for particular applications. They will gain experience with the measurement of physical quantities and the instrumentation required to accurately present information to a controller. Additionally, transducers used to measure common physical quantities are presented in detail, while instrumentation includes a detailed analysis of zero-span circuits, Wheatstone bridges, instrumentation amplifiers, isolation amplifiers, voltage-to-current and voltage-to-frequency modules used for faithful signal transmission, digital-to-analogue and analogue-to-digital circuits to deepen student learning.

**Level:** Undergraduate Level 3 subject

**Pre-requisite(s):** ELEC 2001 OR ENGR 2001

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 3009 Power Systems (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec3009/>) **Legacy Code:** 300771

This subject provides students with a global picture of electrical energy systems. Through practical exercises students will examine and analyse the basic processes of generation, transmission and distribution, power system analysis and planning as well as power systems operation under steady-state and transient conditions. Various aspects of power system operation including harmonics, fundamentals of protection, environmental issues and renewable energy systems are also covered in this subject.

**Level:** Undergraduate Level 3 subject

**Pre-requisite(s):** ELEC 2010 or ELEC 3011

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 3010 Renewable Energy Systems Design (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec3010/>) **Legacy Code:** 301425

This subject prepares engineering students to be conversant with renewable energy systems. Students will learn to appraise environmental, social, legal, economic and political issues concerning renewable energy systems. Students will also learn relevant design skills related to renewable energy systems.

**Level:** Undergraduate Level 3 subject

**Pre-requisite(s):** ELEC 1003 AND ENGR 1011

**Equivalent Subjects:** ELEC 4006 Sustainable Energy Systems

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 3011 Power and Machines (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec3011/>)

This subject develops an understanding of the basic concepts of power and machines, including modern power systems and transformers, in addition to the fundamentals of electromechanical energy conversion. Students engage in practical activities to develop knowledge and skills in magnetic circuits, balanced and unbalanced three-phase power systems, and transformers. These concepts comprise essential knowledge for electrical engineers.

**Level:** Undergraduate Level 3 subject

**Pre-requisite(s):** ELEC 2001 OR ELEC 2013

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 4002 Power Electronics (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec4002/>) **Legacy Code:** 300772

The subject covers various types of power electronics systems, their applications and use in Electrical Drive Systems. It also covers application considerations and modern developments in electronic systems. This course provides the fundamentals of Power Electronics and Industrial Electronics.

**Level:** Undergraduate Level 4 subject

**Pre-requisite(s):** ELEC 2010 AND ELEC 2004

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 4003 Power Quality (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec4003/>) **Legacy Code:** 300995

This subject focuses on general power quality phenomena, how to define them, locate their sources and how to apply mitigation techniques. Through independent learning and teamwork on real world case studies, and by incorporating current standards and practices, students will develop skills to simulate and analyse power quality events. The skills developed in this subject will benefit students who are looking to incorporate sustainable and renewable energy solutions into their engineering career pathways.

**Level:** Undergraduate Level 4 subject

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 4004 Radio and Satellite Communication (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec4004/>) **Legacy Code:** 300489

This subject is offered in alternate years. This subject will develop an understanding of the theory and practice of radio and satellite communication techniques and measurements and provide an introduction to space communication systems. It will complement the general communication engineering units, addressing advanced topics important and specific to radio and satellite communications.

**Level:** Undergraduate Level 4 subject

**Pre-requisite(s):** ELEC 3001 OR ELEC 4001

**Equivalent Subjects:** LGYA 3699 - Satellite Communication

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 4005 Smart Grids and Distributed Generation (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec4005/>) **Legacy Code:** 300996

This subject is designed to model, analyse and control of newly developing areas of distributed generation and smart grids. The subject will cover modelling, control, simulation and protection of such systems. The subject will cover the impacts of renewable sources and power electronics on the operation of smart grids and micro-grids. The subject will also cover environmental and economic impacts of such systems.

**Level:** Undergraduate Level 4 subject

**Pre-requisite(s):** ELEC 3009

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 4006 Sustainable Energy Systems (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec4006/>) **Legacy Code:** 300998

This subject prepares engineering students to work in the area of renewable energy systems and to be knowledgeable and be in a position to appraise environmental, social, legal, economic and political issues concerned with renewable energy systems.

**Level:** Undergraduate Level 4 subject

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 4007 Wireless Communications (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec4007/>) **Legacy Code:** 300065

The subject covers the analysis, design and operation of modern wireless communication systems. The primary focus is on the physical layer and hardware, emphasizing the fundamentals of coding and modulation, spread spectrum and multiple access techniques. Current wireless architectures and mobile communication systems are also covered.

**Level:** Undergraduate Level 4 subject

**Pre-requisite(s):** ELEC 3001 OR ELEC 3002

**Equivalent Subjects:** LGYA 5692 - Digital Communication Engineering

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 4008 Electrical Drives (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec4008/>)

Electrical drives are electromechanical systems which enable electrical machines to function. Through theoretical analyses and practical laboratory exercises, students analyse and evaluate electrical machines and drives as well as examine various types of electrical motors and drive systems, their applications and control. Students conduct experiments on speed control, starting and braking systems, and dynamics of electric motors. These activities comprise essential knowledge and skills for students to be competent in the area of power engineering.

**Level:** Undergraduate Level 4 subject

**Pre-requisite(s):** ELEC 3006

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 4009 Instrumentation and Measurement (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec4009/>)

Through practical exercises students will engage with engineering measurement and instrumentation systems. Students determine the most appropriate measurement method and instrument, such as multimeters, digital oscilloscopes and interfacing modules, for particular applications. They will gain experience with the measurement of physical quantities and the instrumentation required to accurately present information to a controller. Additionally, transducers used to measure common physical quantities are presented in detail, while instrumentation includes a detailed analysis of zero-span circuits, Wheatstone bridges, instrumentation amplifiers, isolation amplifiers, voltage-to-current and voltage-to-frequency modules used for faithful signal transmission, digital-to-analogue and analogue-to-digital circuits to deepen student learning.

**Level:** Undergraduate Level 4 subject

**Pre-requisite(s):** ELEC 2001 OR ENGR 2001

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 6001 Applied Project in Neuromorphic Engineering (40 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec6001/>) **Legacy Code:** 800235

This 40 credit point semester-long subject provides a capstone experience to students enrolled in the Master of Applied Neuromorphic Engineering. Students work on an industry-oriented project with practical application and outcome. Having the intention to go into industry, this subject provides opportunities for students to explore a relevant problem that can be completed in one semester. Students will gain valuable experience and industry insights.

**Level:** Postgraduate Coursework Level 6 subject

**Pre-requisite(s):** INFO 7001 AND

ELEC 6003 AND

COMP 6001 AND

COMP 6002

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 6002 Master Dissertation in Neuromorphic Engineering (80 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec6002/>) **Legacy Code:** 800234

This is a 80 credit point year-long subject taken over two terms (40 credit points in each term). This subject is offered exclusively on campus for students to benefit from mentorships and regular interactions with leading researchers in the field. Students will have the opportunity to contribute towards impactful research projects, aiming at academic growth and progress. To achieve this goal, the Dissertation subject is designed for students to plan and execute a research-based project in the area of Neuromorphic Engineering. The main task in the year-long 80 credit point dissertation subject is an academic research paper that meets publishing standards and is peer-reviewed by external reviewers (getting the article published on a journal is not a completion requirement to the unit). The students shall be part of regular International Center for Neuromorphic Systems (ICNS) interactions, and benefit from supervisors in a discursive setting as the candidate makes progress.

**Level:** Postgraduate Coursework Level 6 subject

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 6003 Neuromorphic Accelerators (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec6003/>) **Legacy Code:** 800231

Problem-oriented thinking and distributed system design are essential for neuromorphic engineers. This subject is designed to provide students with sufficient understanding to neuromorphic processor. Students will be able to implement spiking neural networks by programming neuromorphic processors. The lab work and programming assignments focus on different key aspects of programming neuromorphic processor: Neural modelling, Python programming, debugging code and hardware/software co-simulation. The workshops focus on the concrete implementation of neural networks.

**Level:** Postgraduate Coursework Level 6 subject

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 6004 Neuromorphic Electronics Design (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec6004/>) **Legacy Code:** 800229

Efficient, parallel, low-power computation is a hallmark of brain computation and the goal of neuromorphic engineering. The focus of this subject is to design, implement and test accurate, electronic, very large scale integrated (VLSI) circuit model of neural systems and the associated signal processing. Students will have opportunities to design and build a neural system on hardware and gain resultant insights into applying neuromorphic engineering to real-world problems. This subject will be undertaken at Parramatta City - Hassall St campus.

**Level:** Postgraduate Coursework Level 6 subject

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 6005 Applied Project in Neuromorphic Engineering (Part-time) (40 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec6005/>)

This 40-credit point year-long subject over two semesters (20 credit points each semester) provides a capstone experience to students enrolled in the Master of Applied Neuromorphic Engineering (in the part-time offering). Students work on an industry-oriented project that has a practical application and outcome. Having the intention to go into industry, this subject provides opportunities for students to explore a relevant problem that can be completed in one year. Students will gain valuable experience and industry insights.

**Level:** Postgraduate Coursework Level 6 subject

**Pre-requisite(s):** INFO 7001 - Advanced Machine Learning

ELEC 6003 - Neuromorphic Accelerators

COMP 6001 - Neuromorphic Algorithms and Computation

COMP 6002 - Neuromorphic Sensing

**Equivalent Subjects:** ELEC 6001 - Applied Project in Neuromorphic Engineering

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 7001 Advanced Control Systems (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec7001/>) **Legacy Code:** 300603

This subject covers continuous and discrete control systems. It reviews and builds on the fundamental concepts of the theory of feedback in continuous and discrete time to examine the analysis and design of advanced continuous and discrete time linear control systems. Transfer function and state variable methods are employed. Instruction makes use of extensive experimental tasks. There is also considerable use of Matlab simulations.

**Level:** Postgraduate Coursework Level 7 subject

**Incompatible Subjects:** LGYA 5850 - Digital Control LGYA 5813 - Advanced Control Systems

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 7002 Advanced Data Networks (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec7002/>) **Legacy Code:** 300173

This subject covers all major network technologies: asynchronous transfer mode (ATM), Internet, and telephony. Essential networking topics such as protocol layering, multiple access, switching, scheduling, routing, congestion control, error and flow control, and network security are covered in detail. An engineering approach is taken to provide insight into network design.

**Level:** Postgraduate Coursework Level 7 subject

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 7003 Advanced Electrical Machines and Drives (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec7003/>) **Legacy Code:** 300601

The subject covers various types of electrical motors and drive systems, their applications and control. The subject aims to introduce an advanced study of electrical machines and drives. It also covers application considerations and modern developments in high performance drive systems. This course covers various types of the speed control, the starting, the braking and the dynamics of different electrical machines and drives.

**Level:** Postgraduate Coursework Level 7 subject

**Incompatible Subjects:** LGYA 5847 - Variable Speed Electric Drives LGYA 5844 - Special Electrical Machines

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 7004 Advanced Power Quality (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec7004/>) **Legacy Code:** 301025

This subject is to introduce students to power quality phenomena such as voltage sag/swell, distortions, unbalance, and flicker that occur in power systems. The subject also introduces terms and definitions associated with power quality, following which each phenomenon, that is, voltage sag/swell, transient overvoltage, and harmonics. In addition, flicker is presented and discussed in detail for students to understand the sources and impact of these occurrences on power system as well as typical mitigation techniques. Finally, students are introduced to power quality benchmarking, monitoring, assessment. In addition Advanced knowledge on network frequency responses is presented.

**Level:** Postgraduate Coursework Level 7 subject

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 7005 Advanced Signal Processing (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec7005/>) **Legacy Code:** 300596

This subject covers the principles and techniques in signal processing. The subject matter includes advanced topics in discrete-time signals and systems, the z-transform and its applications in signal processing, advanced topics in the sampling of continuous-time signals, FIR and IIR filter design, filter structures, and the discrete Fourier transform and its computation. Students develop skills of analysing and designing digital signal processing systems.

**Level:** Postgraduate Coursework Level 7 subject

**Equivalent Subjects:** LGYA 5840 - Signal Processing 1

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 7006 Advanced Smart Grids and Distributed Generation (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec7006/>) **Legacy Code:** 301026

This subject is designed to model, analyse and control of newly developing areas of distributed generation and smart grids. The subject will cover modelling, control, simulation and protection of such systems. The subject will also cover the impacts of renewable sources and power electronics on the operation of smart grids and micro-grids. The subject will also cover environmental and economic impacts of such systems.

**Level:** Postgraduate Coursework Level 7 subject

**Restrictions:** Please see the Subject Details page for any restrictions for this subject



**ELEC 7008 Instrumentation and Measurement (PG) (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec7008/>) **Legacy Code:** 300515

This subject covers topics associated with the measurement and presentation of physical parameters. A wide range of transducers are presented in detail, while instrumentation includes a detailed analysis of a multitude of analogue and digital circuits used to amplify, transmit, and display electrical signals. The application of these modules in modern measurement equipment is presented in details.

**Level:** Postgraduate Coursework Level 7 subject

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 7009 Personal Communication Systems (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec7009/>) **Legacy Code:** 300196

This subject covers the design fundamentals of cellular systems, including frequency reuse, channel assignments, radio wave propagation in mobile environments, modulation techniques, coding techniques, spread spectrum and multiple access. It includes topics from emerging wireless technologies, and third-generation mobile communication systems and standards.

**Level:** Postgraduate Coursework Level 7 subject

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 7010 Power System Planning and Economics (10 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec7010/>) **Legacy Code:** 300197

This subject covers planning techniques for energy and electrical power systems. It also covers the economics of various options and reliability of electrical power systems.

**Level:** Postgraduate Coursework Level 7 subject

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 9001 Higher Degree Research Thesis - Engineering (Computer) (80 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec9001/>) **Legacy Code:** 800053

**Level:** PhD and Research Masters Level 9 subject

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 9002 Higher Degree Research Thesis - Engineering (Electrical) (80 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec9002/>) **Legacy Code:** 800051

**Level:** PhD and Research Masters Level 9 subject

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 9003 Higher Degree Research Thesis - Engineering (Mechatronic) (80 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec9003/>) **Legacy Code:** 800057

**Level:** PhD and Research Masters Level 9 subject

**Restrictions:** Please see the Subject Details page for any restrictions for this subject

**ELEC 9004 Higher Degree Research Thesis - Engineering (Telecommunications) (80 Credit Points)**

**Subject Details** (<https://hbook.westernsydney.edu.au/subject-details/elec9004/>) **Legacy Code:** 800055

**Level:** PhD and Research Masters Level 9 subject

**Restrictions:** Please see the Subject Details page for any restrictions for this subject