

Ready for Electronics but not quite ready for Uni?

Associate Degree in Electronic Engineering

(Code: ADD, SATAC Course Code: 952314)

Duration:	2 years full time
Cost:	max \$2210/year (subject to change)
Min Entry Requirements:	SACE Stage2 including a Satisfactory Achievement in Maths

2 years at TAFE + 2 years at Uni = Bachelor of Engineering degree

(Electronics)

(Typical duration of Bachelor of Eng = 4 years full-time)

- ✓ developed by TAFE SA , University of Adelaide and the Technology Industry Association.
- ✓ **affordable:** max. \$2210/year (subject to change)
- ✓ **strong practical emphasis**
- ✓ **small classes**
- ✓ **multiple entry and exit points** in the vocational education and training suite of qualifications.

Be Practical About Your Future

For more information contact us on 8348 4328

Associate Degree in Electronic Engineering

(Code: ADD, SATAC Course Code: 952314)

Are you currently looking for a course to start a new and rewarding career?

Would you like to:

- gain maximum credit in a related Engineering university degree
- develop good hands on skills
- develop a strong theoretical background in electronics
- work with engineers and researchers to develop and integrate complex electronic systems
- learn about work practices in the Electronics industry

then this NEW course is for you!

The Associate Degree in Electronic Engineering has been developed by TAFE SA Electronics and Computer Systems Engineering in collaboration with the University of Adelaide and the Electronics Industry Association. This new, exciting course focuses on the development of strong academic skills as well as solid practical skills. These skills are essential for the testing, modification, design and integration of hardware and software in complex electronics systems.

The two year program combines theoretical and practical components as applied to the building, testing, maintenance and design of electronics systems. The program is designed to develop students' analytical and research skills. The program was designed to maximise the amount of credit to be obtained in related Bachelor of Engineering degrees offered at the South Australian universities.

The course is designed to offer multiple entry and exit points in the vocational education and training suite of qualifications.

Benefits:

- affordable (max. \$2210/year – subject to change)
- Full Time study duration: only 2 years – after this you gain a qualification and 2 years credit in a Bachelor in Electrical and Electronic Engineering at University of Adelaide
- small classes
- strong practical emphasis
- multiple entry and exit points in the vocational education and training suite of qualifications.

Highlights of the course include:

- using advanced mathematical skills to solve problems in electronics
- designing and testing of software related to practical engineering applications
- designing, developing, testing, commissioning and maintaining electronic systems
- designing and testing of advanced analog, digital and RF electronic circuits
- designing software and hardware for microprocessor interfacing
- using computer simulation and CAD tools
- managing electronic projects.

Course content

To complete the course you will need to study core subjects like:

- Electronics Mathematics
- Computer Science
- Analog Electronics
- Digital Electronics
- Project Management
- Engineering Project
- Electronics Practice
- Engineering Science
- Students are also required to choose an elective (TAFESA or Uni).

For more details on the subject contents, see Appendix A below.

Articulation into University

Credit transfer of up to 2 years of study is in place for successful graduates for the Bachelor of Engineering (Electrical and Electronic) offered at the University of Adelaide, subject to University entry requirements. Credit transfer arrangements also exist with University of South Australia and Flinders University for similar Bachelor degree programs.

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Minimum Entry Requirements

To be eligible for the course you need to have completed:

- satisfactory completion of SACE Stage2 including a Satisfactory Achievement in Mathematics

OR

- Any Certificate III in Engineering or higher

OR

- satisfactory achievement in STAT

Enrolment into the Course

You can enrol by applying through SATAC at www.satac.edu.au or directly to the campus. For enrolment and credit transfer arrangements, please contact the Administration Office, (ph 8348 4328, electronics@tafesa.edu.au).

Course Duration: 2 years full time

Course Start: There are 2 intakes per year, one in January and another one in July.

Course Structure

The following schedule shows the sequence of delivery. For more details please contact the Administration Office.

NOTE: Please see the disclaimer at the bottom of the page.

Level 1

Course Unit	Hours	Comments
Electronics Practice 1	160	Semester 1 of study
Basic Electronic Circuits	180	
Electronics Mathematics 1	100	
Electronics Mathematics 2	100	
Digital Electronics	100	
Analogue Electronics 1	180	Semester 2 of study
Filters and Oscillators	120	
Microcontroller-based systems	80	
Communications Systems	60	
Computer Science 1	120	

Level 2

Course Unit	Hours	Comments
Electronics Practice 2	100	Semester 1 of study
Electronics Mathematics 3	120	
Complex Power Supplies	40	
Circuit Analysis	80	
Analogue Electronics 2	140	
Computer Science 2	120	Semester 2 of study
Analogue Electronics 3	100	
Advanced Digital Systems	60	
Computer Science 3	120	
Digital Signal Processing	80	
Project Management	60	
Engineering Project	100	
Engineering Science	40	
Elective	40	

Course Fees

The course fees are \$2210 per year (no concession) and \$1620 per year (concession). This cost does not include books and extra materials. Please allow an extra \$500 for this. **NOTE:** Please see the disclaimer at the bottom of the page.

Appendix A Subject Content Details

Associate Degree Subject	Content
<p>Electronics Mathematics 1 (100 hrs)</p>	<ul style="list-style-type: none"> • Indices and Surds • Ratios and Percentages • Conversion of measurement units • Solving worded problems • Algebraic Expressions • Solving simple equations • Transposition • Relations and Functions • Logarithms • Quadratics • Pythagoras Theorem and Trig ratios • Applications of trigonometry: Phasors and complex numbers as used in AC circuit analysis • Trigonometric Functions and their applications in electronics signals
<p>Electronics Mathematics 2 (100 hrs)</p>	<ul style="list-style-type: none"> • Matrices and Linear Equations: matrix algebra; special matrices: unit, null, transposed, orthogonal, singular, symmetric; inverse matrix • Sets of linear equations: linear systems of equations; Gauss elimination; Gauss-Jordan elimination, existence and uniqueness of solutions • Determinants: general properties, rank of det and matrix, Cramer's rule, existence and uniqueness of solutions (fund theorem) • Vector spaces: vector algebra, linear independence, subspaces, dimension, basis • Eigenvalues and Eigenvectors: eigenvalues, eigenvectors of matrices; linear independence, characteristic equation, trace, determinant, multiplicity; similar matrices, diagonalisation • Vector spaces R^n : null spaces, column spaces; rank and rank theorem; scalar product; distance, length, angle between vectors; orthogonal vectors, orthonormal bases; Gram-Schmidt process • Linear Transformations: Kernel and range, the matrix of a linear transformation, dimension theorem • Series: sequences and series, progressions, convergence
<p>Electronics Mathematics 3 (120 hrs)</p>	<ul style="list-style-type: none"> • Limits – revision: definition, uniqueness, elementary limits, limit laws, left-hand, right-hand limits • Derivatives – revision: differentiation, the squeeze theorem, trig limits, rates of change; rules for derivatives, the Chain Rule; derivatives of inverse functions • Integration – revision: area, definite integral, fundamental theorem, using integration formulae • Functions: continuity; continuity on an interval; discontinuities; continuity and differentiation; unbounded functions; l'Hopital's rule; graphs (min/max, inflection, concavity) • Applications of Differentiation: applied max/min, Rolle's theorem and zeros • Integration – techniques: improper integrals; techniques of integration: substitution, by parts, trig, partial fractions; numerical integration • Applications of Integrals: mean, rms, volumes • Differential equations: First order separable, Linear first order, linear second order with ct coeff.; applications to modelling – the logistic equation, volumes • Taylor Series: Taylor and Maclaurin polynomials; Taylor's theorem; error terms; power series, geometric series, convergence; Taylor and Maclaurin series, binomial series, differentiation and integration of power series • Calculus of more than 1 variable: functions of more than 1 variable, limits and continuity, partial derivatives; mixed derivatives of higher order, chain rules; directional derivative, gradient, max rates of change; tangent planes, local max and min; second derivative test for functions of 2 variables.
<p>Analog Electronics 1 (180 hrs)</p>	<ul style="list-style-type: none"> • The purpose and application of amplifiers • Basic characteristics of small signal amplifiers (input and output impedance, current and voltage gain, bandwidth) • DC bias conditions for a single-stage amplifier • Small signal terminal characteristics of single-stage amplifiers • Effects of coupling and bypass capacitors in single-stage amplifiers

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	<ul style="list-style-type: none"> • Various operational amplifier circuit configurations and where they are used • Measured and calculated values of gain and output voltage for operational amplifier configurations (inverting, non-inverting, voltage follower, summing, comparators and Schmitt trigger differential) • Operation of multistage amplifiers • Predictable effects on the output voltage when amplifiers are subjected to control signal overdrive, bias faults and amplifying device faults • Operating principles and application of DC power supplies • Rectification circuits
Analog Electronics 2 (140 hrs)	<ul style="list-style-type: none"> • demonstrate an understanding of analogue electronic circuits concepts • analyse the performance of analogue electronic circuits • select correct tools and methods for analysis of circuits • modify, and redesign analogue circuits • demonstrate proficiency in the use of electronics measuring instruments • conduct and analyse relevant measurements and tests • identify common sources of error ; avoid them, eliminate or compensate for them where possible, and quantify their significance to results and conclusions drawn • fault-find analogue electronics circuits and subsystems
Analog Electronics 3 (100 hrs)	<ul style="list-style-type: none"> • Sensors and transducers: static and dynamic characteristics • Sensor types : strain and force; thermocouples; displacement, location, proximity; motion; light and radiation; pressure • Signal amplification techniques • Laplace transforms techniques and Fourier series; • Diff. equation description of circuits, response under different excitations; Transfer functions techniques
Engineering Science (40 hrs)	<ul style="list-style-type: none"> • Linear Motion • Force and gravity • Newton's laws of motion • Rotational motion • Potential and kinetic energy • Principle of energy conservation • Electrostatics • Magnetic fields • Nature and propagation of electromagnetic waves • Ampere and Gauss laws
Computer Science 1 (120 hrs)	<p>Java programming techniques</p> <ul style="list-style-type: none"> • Data and variables • Program flow • Classes • Inheritance • Polymorphism • Graphical User Interfaces
Computer Science 2 (120 hrs)	<ul style="list-style-type: none"> • Programming techniques as applicable to embedded system-based applications • GUI design as used in the interface with embedded systems • Lists, stacks, queues, sets, trees and hash tables and related algorithms
Computer Science 3 (120 hrs)	<ul style="list-style-type: none"> • Programming techniques as applicable to embedded system-based applications • Programming techniques using C/C++ • Interrupts; Programmable timers; ADCs; Input Capture; Output Compare
Elective (40 hrs)	<p>Students are required to choose an elective from a wide range of subjects offered at TAFESA or at any University.</p>
Electronics Practice 1 (160 hrs)	<ul style="list-style-type: none"> • OH&S principles ;Documenting hazards and identifying risks • Hand and Power Tools • High reliability soldering • Soldering of Surface Mount Devices; Lead free soldering • Component recognition • Enterprise communication methods; Enterprise work activities records
Digital	<ul style="list-style-type: none"> • Comparison of analogue and digital signals

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Electronics (100 hrs)	<ul style="list-style-type: none"> • Conversion between hex, binary and decimal number systems • Precautions when handling electronic devices due to electrostatic discharge • Basic operation and characteristics of current sequential and combinatorial logic devices. Note: examples are: logic gates, multiplexers, counters, etc • Techniques for the analysis of simple digital systems encompassing: understanding of timing diagrams, prediction of the output state of logic devices for various input combinations, interfacing between logic families, etc • Basic operation and characteristics of current A/D and D/A converters
Basic Electronic Circuits (180 hrs)	<ul style="list-style-type: none"> • Electronic circuits concepts: definitions, basic quantities and units • Ohm's law, measuring R, V, I, circuit symbols • Electricity and magnetism: charge and current; batteries • DC circuits: series, parallel • Principles of AC signals and circuits • Basic introduction to physics concepts as encountered in electronics applications (sound, light, basic transducers) • Introduction to electronic systems (audio, video, communications)
Filters and Oscillators (120 hrs)	<ul style="list-style-type: none"> • AC signals (frequency, period, phase, average, rms) • Test equipment (CRO, signal generator, ac measuring instruments) – calibration, limitations, • Phasor diagrams • Analysis of RL circuits: series and parallel • Analysis of RC circuits: series and parallel • Analysis of RLC circuits: series and parallel • Ideal transformers • High pass, low pass, band pass and band stop filters (operation, frequency response, bandwidth, attenuation, roll off, order of filter, test and measurements)
Microcontroller-based Systems (80 hrs)	<ul style="list-style-type: none"> • Microcontroller architecture • Program storage types • Data storage types • I/O Ports: analogue/ digital • Integrated Peripherals: timers, interrupts etc • Control circuitry: system clock, reset etc • Industry standard programming environment
Communications Systems (60 hrs)	<ul style="list-style-type: none"> • demonstrate an understanding of electromagnetic radiation • analyse the performance of a communication system • demonstrate critical problem solving skills related to the assessment and selection of communication systems • demonstrate basic proficiency in the use of electronics communication measuring instruments • conduct and analyse relevant measurements and tests • fault-find electronics communications subsystems
Electronics Practice 2 (100 hrs)	<ul style="list-style-type: none"> • Printed circuit board materials and processes • Factors influencing the design of PCBs • PCB design tools and software • PCB design standards • Factors to consider in clarifying the nature of a fault • Methods for testing assumptions: Visual inspection; Sectional testing; Split-half tests; Component isolation
Complex Power Supplies (40 hrs)	<ul style="list-style-type: none"> • Operation and characteristics of linear and switched mode power supplies • Regulator types and their characteristics: Linear- series, Linear- shunt, Switched-mode, Zener. • Isolation requirements and circuitry • Radiation suppression circuitry • Diagnostic procedures to isolate faults
Circuit Analysis (80 hrs)	<ul style="list-style-type: none"> • DC circuit analysis: Voltage and current sources; Kirchoff's voltage and current law; Mesh and nodal analysis; Superposition theorem; Thevenin's theorem; Norton's theorem; Millman's theorem; Maximum power transfer • AC circuit analysis: Sinewaves, phasors, radians; AC circuits: series and parallel ; Apparent, reactive and real power, power factor correction; Source conversions; Series to parallel conversions; Mesh and nodal analysis; Superposition theorem; Thevenin's theorem; Norton's theorem; Maximum

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	power transfer; Resonance
Advanced Digital Systems (60 hrs)	<ul style="list-style-type: none"> • demonstrate an understanding of digital design techniques • analyse the performance of digital electronic circuits • select correct tools and methods for analysis, design and implementation of digital circuits • modify, and redesign digital circuits • demonstrate proficiency in the use of electronics measuring instruments • conduct and analyse relevant measurements and tests • select digital devices for the design of digital systems • fault-find digital electronics circuits and subsystems
Digital Signal Processing (80 hrs)	<ul style="list-style-type: none"> • Signal processing concepts: Shannon's Sampling Theorem.; quantisation noise; spectrum of a sampled signal; response required for the input anti-alias filter; response required for the output reconstruction filter, including $\sin(x)/x$ compensation. • Impulse response of a linear-phase filter: (LP, BP, HP). • FIR filters: process of convolution; standard expression for discrete convolution.; DSP system and convolution; DSP system to implement a FIR filter. • Adaptive filters: practical applications for adaptive filters; number of taps needed on an adaptive filter for a given application; DSP system and implementation of adaptive filter. • DSP Architecture • Modifying DSP code • Input and output analog filters • Simple IIR filters • High order IIR filters
Project Management (60 hrs)	<ul style="list-style-type: none"> • Defining project parameters • Management of: time, Finance, Quality, HR, Communication • Risk management and contingencies • Procurement management
Engineering Project (100 hrs)	<ul style="list-style-type: none"> • Project work