

BENG (HONS) ELECTRONIC ENGINEERING
(including Embedded Systems Degree Apprenticeship)

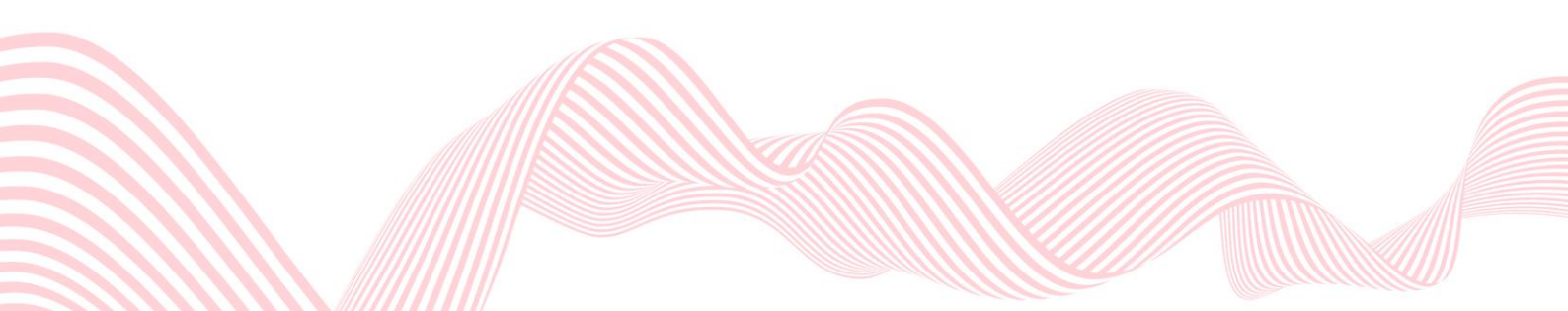
We would like to take this opportunity to firstly welcome you to the Beng (Hons) Electronic Engineering course at Solent University. Our many congratulations. We really hope that this will be an exciting, challenging and valuable chapter in your engineering career. And so, in readiness, we would like to provide you here with a little more detail regarding our expectations and recommendations, so that you perhaps feel a little more prepared when you first start.

Software recommendations

All our students will need to create designs using National Instrument's MultiSim. We will provide student licences for these and there is also a (limited) student online version available. The engineering software packages are available on some of our workstations in the library and Engineering labs. If you consider purchasing an optional computer for your own use and would like to use MultiSim on this, we highly recommend a Windows-based laptop or a desktop machine with a good processor. Note that you can often benefit from student discounts for these purchases once you are enrolled at university.

In addition, you will also need to use a CAD software during your first year. There are two options: SolidWorks and AutoCAD both of which are powerful computer-aided design (CAD) software used for creating precise 2D and 3D drawings. System requirements can be found [here for AutoCAD](#) and [here for SolidWorks](#). As an electronics student, you will use AutoCAD to design and draft mechanical components, but also in later years, for example your project. Familiarity with AutoCAD is an essential skill for engineers, as it enables you to effectively communicate your designs to team members and manufacturers. Once you are enrolled, you can download a free education license copy and use it for the duration of your time as a student. SolidWorks can also be obtained with a free license, once you have enrolled.

While not required for your first-year studies, it's important to note that you will be using MATLAB, a powerful numerical computing environment and programming language, in the second and third year of your engineering course. MATLAB is widely used in both academia and industry for a variety of tasks, including data analysis, algorithm development, and mathematical modelling. Although not necessary for your first year, if you have access to MATLAB, it may be beneficial to familiarize yourself with its basic features and functions to prepare for future coursework. Access to the software will be covered by Solent University.



Health & Safety

As part of the course, you will be participating in practical laboratory sessions and workshops. To ensure your safety during these activities, it is mandatory that you wear appropriate personal protective equipment (PPE), including toe-capped safety shoes. Please ensure to purchase a pair of safety shoes that meet this standard before the start of the academic year, otherwise you cannot enter workshops where you are required to wear them.

Maths

During Welcome Week, you will have the chance to see and try out many facilities and activities which are related to your course. As maths is an important tool for engineering, we have compiled a list of activities we would recommend you carry out during the summer. This will help you to know what maths topics you will be covering in the first part of the first year and give you some practice at maths problems.

This is a summary of the topics for the first 8 weeks of maths:

- 1) Algebra: basic laws of algebra, transposition of formulae, simultaneous equations, linear graphs, BODMAS
- 2) Quadratic Functions: solving by inspection, standard formula and completing the square methods, plus some context for the meaning of solutions and the fact complex solutions can exist
- 3) Exponents and Logarithms: basic laws of exponents and logarithms
- 4) Trigonometry: basic trig identities, Pythagoras and right-angled triangles, non-right angled triangles, and trig as applied to waves, including phasor representation

We would recommend you use www.mathcentre.ac.uk to review your maths learning, the site has a range of reviews and tests. For the Review resources, choose by *Course > Engineering > Algebra > Practice & Revision > Algebra Refresher*. The interactive version is more interesting. Work through sections 1 through 9, although you may also complete sections 10 and 11 if you wish.

Navigate to the Algebra tests by choosing *Course > Engineering > Algebra > Test Yourself*. Try the tests for: brackets, factorising quadratics, linear equations, logarithms, powers, simultaneous equations,

Review Of Formulas And Techniques

Integration Table

$\int x^r dx = \frac{x^{r+1}}{r+1} + c, \text{ for } r \neq -1 \text{ (power rule)}$	$\int \frac{1}{x} dx = \ln x + c, \text{ for } x \neq 0$
$\int \sin x dx = -\cos x + c$	$\int \cos x dx = \sin x + c$
$\int \sec^2 x dx = \tan x + c$	$\int \sec x \tan x dx = \sec x + c$
$\int \csc^2 x dx = -\cot x + c$	$\int \csc x \cot x dx = -\csc x + c$
$\int e^x dx = e^x + c$	$\int e^{-x} dx = -e^{-x} + c$
$\int \tan x dx = -\ln \cos x + c$	$\int \frac{1}{\sqrt{1-x^2}} dx = \sin^{-1} x + c$
$\int \frac{1}{1+x^2} dx = \tan^{-1} x + c$	$\int \frac{1}{ x \sqrt{x^2-1}} dx = \sec^{-1} x + c$

substitution, and transposing. For trigonometry, choose course again: *Engineering > Trigonometry* and choose diagnostic tests in Pythagoras, trigonometric equations, trigonometric ratios.

In general, you need to have a scientific calculator which has basic arithmetic functions, such as addition, subtraction, multiplication, division, exponents, and roots, plus functions like e^x and logarithms to any base, including natural log, plus the basic trigonometric ratios, and their inverses, sin, cos, tan, inverse sin, inverse cos, and inverse tan. It should also include Pi, of course, and the facility to select degrees or radians for calculations involving angles.

Your calculator should not have the facility to solve any kind of algebraic equation/process for you, and/or to show the steps of that process on screen. – (For example, it should not be able to solve quadratics, or simultaneous equations, or to do differentiation, or integration, for you, or to show the steps/working of that on screen). It should not be able to be programmed for any arbitrary function (for example using Python). – It should not be able to do graphing, or to display graphs on screen. – It should not have any kind of WiFi/communications function which allows it to connect to the internet or to other devices. All the above still applies, even if the calculator has an ‘exam mode’ to lock those functions out. You might already have a calculator such as the Casio fx-85GT-Plus, which is suitable.

Hopefully the review and diagnostic tests will give you some understanding of what we are expecting you to learn during the first part of the maths module starting in September! Don’t worry if you don’t know everything yet, but it will be helpful to be familiar with these topics.

We are re really looking forward to welcoming you to Solent Uni in September and wish you all the best for the summer!

On behalf of the Engineering Team,

Dr Nils Bausch
Course Leader

