Avionic Systems with a Year Abroad MEng

COURSE DETAILS

- A level requirements: [AAA](#)
- UCAS code: H412
- Study mode: Full-time
- Length: 5 years

KEY DATES

- Apply by: [29 January 2025](#)
- Starts: 22 September 2025

Course overview

Study Avionic Systems at Liverpool and become part of one of the most important sectors in the aerospace industry. Electronic systems associated with flight are known by the term 'avionics', and cover everything from internal control systems to airborne communication.

INTRODUCTION

This degree programme aims to prepare you to work in a variety of related disciplines: radar systems, GPS/inertial navigation systems, guidance and control, and avionics systems design.

The MEng programme provides a deeper level of knowledge than the BEng, allowing for more specialisation and a faster route to a recognised professional qualification as a Chartered Engineer.

We have strong links with industry, meaning you will gain experience with industry standard tools, technologies and working methods. A number of undergraduate projects have been generated from actual industrial projects undertaken by staff, including the development of infrared tracking algorithms for missile warning systems and flight control systems for terrain avoidance in low-level flight.

Our Avionics programmes give you the option to learn to fly and to build towards either a National Private Pilot's Licence (NPPL) or a full Joint Aviation Authorities/Private Pilot Licence (JAA/ PPL) in the first year and the 'frozen' Air Transport Pilot's Licence (fATPL) in the second year. If you are seeking a career as a commercial airline pilot it is possible to work towards the fATPL.

WHAT YOU'LL LEARN

- The workings of the sophisticated electronics in modern aircrafts
- How to fly (if you'd like)
- Real-world awareness through the practical application of concepts and theory
- Greater in-depth technical knowledge than that offered by mainstream subject areas
- A basic grounding in all of the necessary technical subjects, plus specialisation within a particular area of avionics.

ACCREDITATION

Accredited by the Institution of Engineering and Technology on behalf of the Engineering Council for the purposes of fully meeting the academic requirement for registration as a Chartered Engineer.

Course content

Discover what you'll learn, what you'll study, and how you'll be taught and assessed.

YEAR ONE

For the optional 'with Pilot Studies', time is factored into the timetable to enable you to acquire the flying time. If you are not sure if you wish to take a BEng (Hons) or an MEng (Hons) degree then we advise that you apply for the MEng and make a final decision at the end of year two.

The pilot studies module is based on the Private Pilot's License (PPL) ground school syllabus. It is studied alongside either the mandatory 20-hour flight training programme for fixed-wing flying (aeroplanes) or the 20-hour flight and ground training programme for rotary-wing flying (helicopters). For the latter, the 20-hour training programme is divided between 10.5 hours flight training and 9.5 hours of helicopter-relevant ground school.

COMPULSORY MODULES

DIGITAL & INTEGRATED ELECTRONICS DESIGN (ELEC143)

Credits: 15 / Semester: semester 2

The module comprises of two parts Digital Electronics and Integrated Electronics. For the Digital part, students are provided with the knowledge of number systems, laws of Boolean algebra and introduced to the basic methods for designing combinational and sequential logic circuits. For the Integrated part, students are introduced to various silicon electronic devices and provided with the opportunity to understand the basic principles of silicon microelectronics designs processes including designing layouts for simple circuit.

ELECTRICAL CIRCUITS & SYSTEMS (ELEC142)

Credits: 15 / Semester: whole session

Fundamental course on circuit analysis techniques.

ELECTROMAGNETISM & ELECTROMECHANICS (ELEC120)

Credits: 15 / Semester: semester 2

This module includes two parts. The first part of this module covers electrostatics, current and permanent electromagnetism. The second part of the module covers electromechanics, including the principles and construction of DC and AC machines, transformers and linear actuators.

ELECTRONIC CIRCUITS (ELEC104)

Credits: 15 / Semester: whole session

This module aims to introduce students to fundamental electronic devices (diodes and transistors), and how these devices are used in amplifier and switching circuits. The module is assessed via two laboratory sessions (20%) and two coursework online assignments (80%).

EXPERIMENTAL SKILLS (ELEC172)

Credits: 7.5 / Semester: semester 1

Introductory module that teaches practical skills for electrical engineering students, focusing on basic laboratory skills. The practical skills are linked with theory presented in other Year 1 modules including those on analogue and digital electronics. The module also includes an introduction to a technical programming language (MATLAB) and an introduction to some of the ethical and sustainability issues that face modern engineers.

INTRODUCTION TO PROGRAMMING IN C (ELEC129)

Credits: 15 / Semester: semester 1

This module is an introductory course to the C computer programming language. The module provides a comprehensive overview of the fundamentals of C programming (variables, data types, operators, pointers, arrays, strings, structures, functions, input/output operations and flow control) and the software development method (specification, analysis, design, implementation/coding and testing).

MATHEMATICS A FOR ELECTRICAL ENGINEERS (ELEC191)

Credits: 15 / Semester: semester 1

Mathematics for students registered in the Department of Electrical Engineering and Electronics, to support their technical modules.

MATHEMATICS B FOR ELECTRICAL ENGINEERS (ELEC192)

Credits: 15 / Semester: semester 2

Basic mathematics for students registered in the Department of Electrical Engineering and Electronics, concentrating on those groups of students who have, on the average, weaker preparation for University level Maths such as entrants with the BTEC qualification (but not limited to that group). Exam practice is another important component of this module. This module follows on from ELEC191

OPTIONAL MODULES

INTRODUCTION TO AEROSPACE ENGINEERING (AERO110)

Credits: 7.5 / Semester: semester 1

A short module to introduce students to the language and main concepts of the aerospace engineer to provide a solid basis for the remainder of their degree programme

PILOT STUDIES 1 (AERO131)

Credits: 7.5 / Semester: semester 1

The module is designed to provide students, who are contemplating a career as a commercial pilot, with an insight into the practical and intellectual skills required to become a pilot. Classroom lectures covering PPL ground school material are given together with 20 hours of practical flight training at a local flying school.

Programme details and modules listed are illustrative only and subject to change.

YEAR TWO

The first two years of the MEng are the same as the BEng programme.

COMPULSORY MODULES

AVIONICS AND COMMUNICATIONS SYSTEMS (AERO250)

Credits: 15 / Semester: semester 2

Introduction to aerospace communications and avionic systems for Aerospace Engineering and Avionics/Aerospace Electronics students.

INSTRUMENTATION & CONTROL (ELEC207)

Credits: 15 / Semester: whole session

This module covers the design and operation of instrumentation devices as well as the design of continuous time control systems.

ELECTRICAL CIRCUITS & POWER SYSTEMS (ELEC209)

Credits: 15 / Semester: semester 1

This module is aimed at equipping students with tools to analyse inter-related electrical circuits and systems and to provide students with an introduction to the components and composition of an electric power system. It also covers the different primary energy sources and the way in which power is delivered to the customers. Teaching and learning are provided through variety of means like formal lectures, problem sheets, supplementary question sheets, worked example sheets along with formative and summative online tests (through CANVAS, the electronic VLE system). Assessment is carried out by means of coursework and final (written) exam.

DIGITAL ELECTRONICS & MICROPROCESSOR SYSTEMS (ELEC211)

Credits: 15 / Semester: semester 2

This module covers two areas. In digital electronics, it covers topics which build on the basic knowledge gained in the first year digital electronics programme and learning some hardware description language (HDL) programming. In microprocessor systems, it introduces the topic from the basics describing how a microprocessor works and learning some assembly language programming.

SIGNALS AND SYSTEMS (ELEC270)

Credits: 15 / Semester: semester 1

Introduces continuous and discrete signal operations and analysis, the frequency domain and spectral analysis, including Fourier Series and Fourier, Laplace and z Transforms. Introduces system quantification and analysis, including pole-zero plots, feedback, basic stability criteria and block diagrams.

ELECTRONIC CIRCUITS AND SYSTEMS (ELEC271)

Credits: 15 / Semester: semester 2

The module concerns the understanding of how electronic amplifier circuits work and some basic ideas on how to design them. This requires an appreciation of linear small-signal equivalent circuits based on device physics and how to use them to assist the design process. Students will also learn how to break down complex circuits into simpler building blocks and how these blocks in turn, represented by linear equivalent circuits, can be combined to achieve the desired functionality. How negative feedback can be applied to produce high performance, stable circuits with high tolerance. The current state of the art is emphasised together with a historical perspective, noting some of the pioneers in the field.

FIELD THEORY AND PARTIAL DIFFERENTIAL EQUATIONS (MATH283)

Credits: 7.5 / Semester: semester 1

(This module is for those EEE students who have not studied at XJTLU).

Maxwell's equations elegantly describe the physical laws governing such things as electrodynamics. Related problems may be posed in terms of vector calculus, or in terms of differential equations. In this module, we revise vector calculus and field theory in three dimensions, using Stokes' theorem and Gauss' theorem to solve explicit physical problems; we evaluate path, surface and volume integrals, and derive general electrodynamic laws. We also consider both the ordinary and partial differential equations arising from real world problems related to Maxwell's equations, and solve them using Fourier series methods.

AIRCRAFT PERFORMANCE (AERO212)

Credits: 7.5 / Semester: semester 1

To acquaint students with the fundamentals of the performance of fixed-wing aircraft; to develop from first principles the theory required to formulate and solve representative performance problems; to discuss the limitations of the theory; to introduce students to the basics of aircraft stability.

OPTIONAL MODULES

PILOT STUDIES 2 (AERO231)

Credits: 7.5 / Semester: semester 1

This module aims to give students the knowledge and understanding of commercial aviation operations and requirements. It expands on the material presented in Pilot Studies 1 and provides the students with the opportunity to engage with the ATPL ground school material. The module is mixture of lectures, group presentations and simulation and is assessed via a 2 hour MCQ exam.

PILOT STUDIES 3 (AERO232)

Credits: 7.5 / Semester: semester 2

This module aims to provide students with an appreciation of the principles and systems required to operate commercial aircraft. The module will consist of traditional classroom exercises combined with opportunities to use flight simulators and to interact with commerical pilots. The module will be assessed using an MCQ exam at the end of the semester.

ELECTROMAGNETICS (ELEC210)

Credits: 7.5 / Semester: semester 2

The objective of this module is to further enhance the students knowledge of electric field/magnetics field and use of Maxwells equations and their use in practical EM applications.

PROBLEM SOLVING & INDUSTRIAL AWARENESS (ELEC224)

Credits: 7.5 / Semester: semester 1

The aim of this module is to provide students with practical work which underpins, confirms and gives application focus for academic study, while testing a wide range of skills.

Programme details and modules listed are illustrative only and subject to change.

YEAR ABROAD (YEAR THREE)

You are required to spend the year abroad on an approved placement at a European or overseas partner institution.

Programme details and modules listed are illustrative only and subject to change.

YEAR FOUR

During this year you will undertake an individual project – examples from previous years have included the design of Uninhabited Air Vehicles (UAVs) and their associated control systems and sensor suites.

COMPULSORY MODULES

FLIGHT DYNAMICS AND CONTROL (AERO317)

Credits: 15 / Semester: whole session

The module introduces key techniques and concepts used in the analysis of the trim, stability, and dynamic response characteristics of conventional fixed-wing aircraft. It builds on the point-performance theory taught in year two, but whereas in the latter, point mass models suffice, it now becomes necessary formally to treat rigid-body motion in three dimensions; this is done by introducing angular momentum, rotating frames of reference, and the Newton-Euler equations.
Notions of trim and of static and dynamic stability are introduced using various simplified reduced degree-of-freedom models, axis systems, and state and control variables. The standard six degree-of-freedom (6-DOF) equations of motion of a rigid aeroplane are developed; it is shown how these can be solved numerically to enable accurate flight simulation, and how they can be linearized. The relationship between the linearizations and the aircraft's natural modes is studied. Also introduced are a several important feedback control design methods, useful for modifying and improving aircraft stability and control characteristics. These include the Root Locus, Bode and Nyquist based design methods, and gain and phase margins as design goals. PID control and compensator design are also presented. Also discussed are linear state-space methods.

AVIONIC SYSTEMS DESIGN (AERO350)

Credits: 7.5 / Semester: semester 2

Avionics includes pretty much all of the electrical sensors and systems that are present on modern aircraft. The aim of tbis module is to provide the opportunity for students to apply their knowledge and creative skills to design and evaluate a practical design solution to meet a given requirement and to further develop their team-working and presentation skills. The module includes 5 weeks lectures to review the fundamentals of avionic systems, and 5 week group project to study/design one of the following 3 avionic systems:i) Instrument Landing System (ILS) ii) Automated Direction Finding (ADF)iii) Distress Frequency Monitoring

RF ENGINEERING AND APPLIED ELECTROMAGNETICS (ELEC311)

Credits: 7.5 / Semester: semester 1

This module will introduce students to the fundamental concepts of high frequency electromagnetics, and circuit design techniques that must be considered in the design of high frequency circuits and systems.

Students will learn in-depth knowledge of transmission lines, the Smith Chart, standing waves and scattering parameters etc.

After this module, students will be able to appreciate the microwave and RF circuit design for contemporary communication systems.

ANTENNAS (ELEC312)

Credits: 7.5 / Semester: semester 2

This module is to introduce antenna theory and applications.

Students will learn the fundamentals of the antenna theory and design, and understand the most important antennas.

ELECTRONICS FOR INSTRUMENTATION & COMMUNICATIONS (ELEC317)

Credits: 15 / Semester: semester 2

The module introduces basic concepts of the electronic circuits required for instrumentation and communication. It deals with a wide range of amplifiers and the problems that might be encountered in a actual application. It also deals with circuitry needed in communication for example oscillators and phase-locked-loops.

IMAGE PROCESSING (ELEC319)

Credits: 7.5 / Semester: semester 1

This module covers the fundamentals of how images are generated, represented, compressed and processed to extract features of interest.

ENGINEERING MANAGEMENT & ENTREPRENEURIAL SKILLS (ELEC352)

Credits: 7.5 / Semester: semester 1

This module covers project management for year 3 students registered in the Department of Electrical Engineering and Electronics. Entrepreneurial skills are also be covered.

MENG PROJECT (ELEC440)

Credits: 30 / Semester: whole session

Individual project for MEng students

OPTIONAL MODULES

DIGITAL CONTROL AND OPTIMISATION (ELEC303)

Credits: 15 / Semester: semester 2

A broad range of topics are covered. Case studies and example tutorials emphasise the practical aspects of digital control design and optimisation.

SIGNAL PROCESSING AND DIGITAL FILTERING (ELEC309)

Credits: 15 / Semester: semester 2

This module is aimed at developing the basic framework for signal processing and to demonstrate its applications. Also, the module provides students with a good understanding of the types, behaviours and design of FIR and IIR digital filters.

Teaching and learning are provided through a variety of means like formal lectures, problem sheets, supplementary questions, along with formative and summative online tests (through CANVAS, the electronic VLE system).

Assessment is carried out by means of two assignments and final (written) exam.

PHOTONICS AND OPTICAL INFORMATION SYSTEMS (ELEC313)

Credits: 15 / Semester: semester 1

The aims of this module are: To introduce students to the fundamental principles of opto/electronic systems for the transfer of information. To introduce the duality of light as both wave and ray. To show intensity and phase related optical principles. To demonstrate optical information transfer through a number of applications.

NEURAL NETWORKS (ELEC320)

Credits: 7.5 / Semester: semester 2

Introduction to neural network theory, applications and artificial intelligence.

DRIVES (ELEC331)

Credits: 7.5 / Semester: semester 1

This module introduces students to a range of electrical machines (AC & DC) using the concepts of rotating magnetic fields and co-energy. This allow students to model their behaviour and select the most appropriate electrical machine for their application.

APPLICATION DEVELOPMENT WITH C++ (ELEC362)

Credits: 15 / Semester: semester 1

This course will help student to understand the object-oriented design concept and to gain knowledge and practical skills of C++ as an advanced programming language.

On successful completion of the module, students should be able to understand/design/develop C++ applications (both console and GUI-based) with a specific emphasis on developing GUI-based applications.

ADVANCED MODERN MANAGEMENT (MNGT352)

Credits: 7.5 / Semester: semester 1

The Aims of this module are as follows:

To introduce the student to various aspects of advanced modern management.

To develop a knowledge and understanding of modern management tools.

To stimulate an appreciation of management and its importance in organisational success.

POWER SYSTEMS AND POWER ELECTRONICS (ELEC301)

Credits: 15 / Semester: semester 1

A core module of electrical engineering for delivering fundamental principles of power systems: including electricity generation, transmission and distribution, and power electronics for conversion of electricity with different frequency and magnitude.

PLASMA SYSTEM ENGINEERING (ELEC391)

Credits: 7.5 / Semester: semester 1

The module introduces to the students the basic concepts of electrical plasmas and how they are used in industry. It concentrates on the engineering principles behind plasma technology rather than the physics of the discharge, however some mathematical approaches are explored so that quantification of the action of plasmas upon material surfaces can be made. The module explains how a gas can turn into a plasma and how high energy ions in the plasma can be generated to process a substrate, such as silicon wafer in micro-electronics fabrication. The module is taught by a mixture of power points notes and chalk and talk. There are a number of question sheets given out to help the students understand the basis plasma-material processes. On completion, students will understand how plasmas are used in industry, they will have an appreciation of some aspects of simple design and how plasmas can be configured for the next generation of fusion power stations.

ELECTROMAGNETIC COMPATIBILITY (ELEC382)

Credits: 7.5 / Semester: semester 2

This module is aimed at developing an in-depth understanding of EMC, the scope of EMC, standards, typical EMC problems and solutions.

Based on the theory, the students are expected to be able to analyse and solve EMC problems, and also use relevant equipment for conducting EMC measurements.

DIGITAL SYSTEM DESIGN (ELEC373)

Credits: 15 / Semester: whole session

This module introduces students to the digital design techniques used in industry and research. The methods for describing digital systems using the Verilog Hardware Description Language (HDL) are introduced. Student will examine the operation of the MIPS Processor and will also be introduced to Altera's NIOS-II Processor. The module is assessed via 4 assignments and two class tests. Altera's Quartus package is used for synthesising the digital systems.

Programme details and modules listed are illustrative only and subject to change.

YEAR FIVE

During this year you will undertake a group project.

COMPULSORY MODULES

ADVANCED GUIDANCE SYSTEMS (AERO430)

Credits: 7.5 / Semester: semester 2

In this module students develop an understanding of the use of advanced guidance laws in autonomous air systems, including the interactions of airframe dynamics, sensors and control surfaces.

RADIO PROPAGATION FOR WIRELESS SYSTEMS (ELEC411)

Credits: 7.5 / Semester: semester 2

This module is aimed for the students to gain a good understanding of radio propagation for wireless systems such as mobile radio and radar. The radio propagation characteristics and theories will be introduced and discussed. Radio propagation models in various medium and scenarios will also be introduced and discussed, and then applied to some systems.

ADVANCED LOW POWER COMPUTER ARCHITECTURE (ELEC470)

Credits: 15 / Semester: whole session

This module covers material for understanding and designing advanced embedded computer systems.

Key topics include computer architecture, low-power design, hardware/software co-design and synthesis techniques.

The module prepares students for research and employment in the leading research groups and embedded system companies in the world.

ADVANCED SYSTEMS MODELLING & CONTROL (ELEC476)

Credits: 15 / Semester: semester 1

This module will provide advanced modeling, simulation and control techniques and to develop student's skill of considering engineering problem in a system point of view.

ELECTROMAGNETIC COMPATIBILITY (ELEC382)

Credits: 7.5 / Semester: semester 2

This module is aimed at developing an in-depth understanding of EMC, the scope of EMC, standards, typical EMC problems and solutions.

Based on the theory, the students are expected to be able to analyse and solve EMC problems, and also use relevant equipment for conducting EMC measurements.

MANAGEMENT OF DESIGN (MNGT413)

Credits: 7.5 / Semester: semester 2

To enable students to develop a general understanding of a wide range of aspects of the design function in a manufacturing company and its management, and in particular a comprehensive understanding of the Design Process. The core of the module is a detailed study of a six-phase model of the Design Process derived from several authors and BS7000: Product Planning and Feasibility; Design Specification; Conceptual Design; Embodiment Design; Detail Design; Post-Design-Release.

DIGITAL AND WIRELESS COMMUNICATIONS (ELEC477)

Credits: 15 / Semester: semester 1

This module provides an extensive coverage of the theory and practice of digital and wireless communication systems, to allow the students to be able to design and develop digital and wireless communication systems at an advanced level, with an awareness of all the main factors involved and of existing and emerging technologies.

MENG GROUP PROJECT (EEE) (ELEC450)

Credits: 30 / Semester: whole session

Final Group Project for MEng students

OPTIONAL MODULES

HIGH VOLTAGE ENGINEERING (ELEC407)

Credits: 15 / Semester: semester 2

This is an advanced, research led course on high-voltage engineering and electrical insulation. It covers the theories, principles and test methods in relation to the operation of power network and electrical apparatuses. In addition to standard lectures students will be given opportunities to visit the high power test laboratory in the Department which is unique among UK universities and a transmission/distribution substation to equip them with first-hand experience in high voltage testing and power delivery.

INFORMATION THEORY AND CODING (ELEC415)

Credits: 7.5 / Semester: semester 2

This module is aimed to provide an extensive overview of the information theory and coding. Different source codes and channel codes are discussed. Cryptography is also covered.

MEASUREMENT, MONITORING AND SENSORS (ELEC421)

Credits: 15 / Semester: whole session

The module aims to provide an understanding of measurment and monitoring and the sensors that are used in power systems. It focusses on a limited number of examples in order to demonstrate the problems encountered in deploy measurement and monitoring systems.

MICROPROCESSOR SYSTEMS (ELEC422)

Credits: 15 / Semester: semester 2

This module will cover three aspects of ARM Cortex M Microprocessors.

The general functionality of the Cortex M series will be introduced along with the Instruction Set Architecture (ISA) Assignment one will be based on Assembly Language Programming.

The internal bus operation of the AHB-Lite interface will be introduced. For Assignment two students will be expected to interface a peripheral to the AHB-Lite bus using a Cortex-M0 soft core. The peripheral and the interface will be coded using Verilog. They will then be required to write a program to verify the operation of their peripheral3. The final aspect will be on using Real-Time operating systems. This will include how synchronisation, communication and resource sharing is implemented using the RTX real-time operating system.

The third and final assignment will be on using RTX to implement a multi-threaded papplication.

RENEWABLE ENERGY & SMART GRID (ELEC435)

Credits: 15 / Semester: semester 2

Core module for MSc Energy and Power Systems about knowledge of renewable energy source, energy conversion, smart grid and micro grid

COMMUNICATIONS NETWORKS (ELEC461)

Credits: 15 / Semester: semester 2

This module introduces the principles of communications networks, thier components and protocols.

Students are provided with basic concepts about network architectures, the reference models used to describe them, the major protocols used at each communications layer, and the tools to analyse the performance of link layer, median access control, Network and Transport layer protocols.

The main protocols for routing packets over the Internet are also introduced, along with an overview of the packet switching architectures used in the core of today's routers.

ADVANCED SIGNAL PROCESSING (ELEC474)

Credits: 15 / Semester: whole session

The module will teach students advanced techniques of signal processing.

POWER SYSTEMS AND POWER ELECTRONICS (ELEC301)

Credits: 15 / Semester: semester 1

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THE INTERNET OF THINGS: ARCHITECTURE AND APPLICATIONS (ELEC423)

Credits: 15 / Semester: semester 1

This module covers two areas. An introduction to the "Internet of Things" which introduces the topic from the basics describing its evolution, its architecture and its application to real-life scenarios. Students will then develop a real IoT application which builds on the basic knowledge of embedded systems and programming, obtained in a EEE or related B.Eng degree which includes knowledge of digital electronics and microprocessor systems and the ability to programme in C.

ADVANCED MODERN MANAGEMENT (MNGT352)

Credits: 7.5 / Semester: semester 1

The Aims of this module are as follows:

To introduce the student to various aspects of advanced modern management.

To develop a knowledge and understanding of modern management tools.

To stimulate an appreciation of management and its importance in organisational success.

COMPUTATIONAL INTELLIGENCE (COMP575)

Credits: 15 / Semester: semester 2

Biologically inspired optimisation and introduction to neural networks for artificial intelligence.

DIGITAL CONTROL AND OPTIMISATION (ELEC303)

Credits: 15 / Semester: semester 2

A broad range of topics are covered. Case studies and example tutorials emphasise the practical aspects of digital control design and optimisation.

SIGNAL PROCESSING AND DIGITAL FILTERING (ELEC309)

Credits: 15 / Semester: semester 2

This module is aimed at developing the basic framework for signal processing and to demonstrate its applications. Also, the module provides students with a good understanding of the types, behaviours and design of FIR and IIR digital filters.

Teaching and learning are provided through a variety of means like formal lectures, problem sheets, supplementary questions, along with formative and summative online tests (through CANVAS, the electronic VLE system).

Assessment is carried out by means of two assignments and final (written) exam.

NEURAL NETWORKS (ELEC320)

Credits: 7.5 / Semester: semester 2

Introduction to neural network theory, applications and artificial intelligence.

DIGITAL SYSTEM DESIGN (ELEC473)

Credits: 15 / Semester: whole session

This module introduces students to the digital design techniques used in industry and research. The methods for describing digital systems using the Verilog Hardware Description Language (HDL) are introduced. Students will examine the operation of the MIPS Processor and will also be introduced to Altera's NIOS-II Processor. The module is assessed via four assignments and two class tests. Altera's Quartus package is used for sythesising the digital systems.

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HOW YOU'LL LEARN

Programmes are taught over two semesters, with examinations at the end of each semester. Modules vary from those which are assessed by examination only, to others which are continuous assessment only. All programmes incorporate a substantial practical

component, with an increasing emphasis on project work as you progress through to the final year.

HOW YOU'RE ASSESSED

Assessment on this course will include a mix of exams, coursework and projects.

LIVERPOOL HALLMARKS

We have a distinctive approach to education, the Liverpool Curriculum Framework, which focuses on research-connected teaching, active learning, and authentic assessment to ensure our students graduate as digitally fluent and confident global citizens.

Careers and employability

As a graduate of this programme you will be equipped with the skills and knowledge to work in one of the most important sectors of the aerospace industry. The avionics in most aircraft will be upgraded several times during the life of the airframe, making Avionic Systems a major employer both in the UK and internationally.

Some of our graduates go on to work in the industrial sector, in government and in education, whilst others enter non-technical professions such as banking, accountancy, management and law.

If you are seeking a career as a commercial airline pilot, it is possible to work towards the 'frozen' Air Transport Pilot's Licence (fATPL) as part of this course.

Many graduates have moved on to have careers with employers and sectors such as:

• Avionics/Aerospace Sector: ARM Holdings Ltd, Deva Electronic Controls, Ericsson Ltd, Marconi, Siemens UK.
• Energy/Utilities Sector: British Nuclear Group, Energetix Group PLC, Scottish Power, United Utilities PLC
• Technology/IT Sector: Logica CMG.
• Royal Liverpool University Hospital (Clinical Engineering)
• Science and Technology Facilities Council
• Siemens UK
• Scottish Power
• The Highways Agency
• United Utilities PLC.

100% OF ELECTRICAL ENGINEERING AND ELECTRONICS STUDENTS ARE IN WORK AND/OR FURTHER STUDY 15 MONTHS AFTER GRADUATION.

Discover Uni, 2018-19.

Fees and funding

Your tuition fees, funding your studies, and other costs to consider.

TUITION FEES

UK fees (applies to Channel Islands, Isle of Man and Republic of Ireland)	
Full-time place, per year	£9,250
Year in industry fee	£1,850
Year abroad fee	£1,385

International fees	
Full-time place, per year	£27,200
Year abroad fee	£13,600

Fees shown are for the academic year 2024/25. Please note that the Year Abroad fee also applies to the Year in China.
Tuition fees cover the cost of your teaching and assessment, operating facilities such as libraries, IT equipment, and access to academic and personal support. [Learn more about paying for your studies.](#).

ADDITIONAL COSTS

We understand that budgeting for your time at university is important, and we want to make sure you understand any course-related costs that are not covered by your tuition fee. This may include a laptop, books, or stationery. All safety equipment, other than boots, is provided free of charge by the department. An additional fee of approximately £3,400 is required to cover the costs of the mandatory 20 hours pilot training that is required for all students who choose the Pilot Studies pathway and work towards the NPPL, JAA/PPL and fATPL.

Find out more about the [additional study costs](#) that may apply to this course.

SCHOLARSHIPS AND BURSARIES

We offer a range of scholarships and bursaries to provide tuition fee discounts and help with living expenses while at university.

Check out our [Liverpool Bursary](#), worth up to £2,000 per year for eligible UK students. Or for international students, our [Undergraduate Global Advancement Scholarship](#) offers a tuition fee discount of up to £5,000 for eligible international students starting an undergraduate degree from September 2024.

[Discover our full range of undergraduate scholarships and bursaries](#)

Entry requirements

The qualifications and exam results you'll need to apply for this course.

Your qualification	Requirements [About our typical entry requirements](#)
A levels	AAA All of our Avionics programmes have the option of a Pilot Studies pathway. This enables you to learn how to fly and obtain a pilot's license as part of your timetabled activities. For further details see the overview section. Applicants with the Extended Project Qualification (EPQ) are eligible for a reduction in grade requirements. For this course, the offer is **AAB** with **A** in the EPQ. You may automatically qualify for reduced entry requirements through our [contextual offers scheme](#).
GCSE	4/C in English and 4/C in Mathematics
Subject requirements	A level Mathematics and a science subject (Chemistry, Computer Science, Further Mathematics, Physics or Electronics). For applicants from England: For science A Levels that include the separately graded practical endorsement, a Pass is required.
BTEC Level 3 Subsidiary Diploma	Distinction* in BTEC (any subject) plus AA in A Levels. A Levels must include Mathematics and a science subject (Chemistry, Computer Science, Further Mathematics, Physics or Electronics).
BTEC Level 3 Diploma	D*D* in a relevant BTEC considered alongside grade A in A Level Mathematics.
BTEC Level 3 National	D*D*D* and grade A in A Level Mathematics.

Your qualification	**Requirements** [About our typical entry requirements](#)
Extended Diploma	
International Baccalaureate	36 overall, including 5 in Higher Level Mathematics and 5 in a Higher Level science subject.
Irish Leaving Certificate	H1, H1, H2, H2, H2, H2 including H1 in Mathematics and a science subject (Chemistry, Computer Science, Further Mathematics, Physics or Electronics).
Scottish Higher/Advanced Higher	AAA in Advanced Highers including Mathematics and a science subject (Chemistry, Computer Science, Further Mathematics, Physics or Electronics).
Welsh Baccalaureate Advanced	Accepted at grade A alongside A Level grades AA in Mathematics and a science subject (Chemistry, Computer Science, Further Mathematics, Physics or Electronics).
Cambridge Pre-U Diploma	D3 in Cambridge Pre U Principal Subject is accepted as equivalent to A-Level grade A M2 in Cambridge Pre U Principal Subject is accepted as equivalent to A-Level grade B Global Perspectives and Short Courses are not accepted.
Access	Considered if taking a relevant subject. 42 Level 3 credits at Distinction, including 15 Level 3 credits in Mathematics is required. GCSE English and Mathematics grade C/4 or above also required. Students will be required to take an online Mathematics assessment, please contact the University for further information.
International qualifications	Many countries have a different education system to that of the UK, meaning your qualifications may not meet our entry requirements. Completing your Foundation Certificate, such as that offered by the [University of Liverpool International College](#), means you're guaranteed a place on your chosen course.

ALTERNATIVE ENTRY REQUIREMENTS

- If your qualification isn't listed here, or you're taking a combination of qualifications, [contact us](#) for advice

- [Applications from mature students](#) are welcome.

THE ORIGINAL REDBRICK