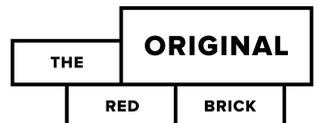# UNIVERSITY OF LIVERPOOL

Electrical Engineering, Electronics and Computer Science

2+2

Contents

Why choose the 2+2 at the University of Liverpool?

Our story began in 1881 . . .The University of Liverpool became one of the first civic universities. **The original redbrick.**

Nearly 140 years later, we are still as original as ever - offering different viewpoints and daring ideas. Unique perspectives and a city bursting with character. We are uncovering world firsts through our pioneering research and helping you to forge your own original path. Studying in Liverpool will provide you with an amazing, life-changing university experience that will help you to achieve your ambitions.

Internationally recognised
- Ranked 165th in the Times Higher Education (THE) World University Rankings (2020)
- Ranked 164th in the QS World University Rankings (2019)
- 20th in the UK for research power with 7 subjects ranked in the top 10 in the UK's Research Excellence Framework (both Chemistry and Computer Science ranked #1 in the UK for 4* & 3* research THE 2014).

Benefits of studying in the UK
- Develop communication skills, flexibility, adaptability, empathy and a global outlook – attributes which are highly sought by employers
- No need for an IELTS when applying for postgraduate study in the UK
- Opportunity to explore the UK and Europe.

Graduate outcomes for 2+2ers
- 76% of all 2+2 graduates in Liverpool achieved a 1st or 2:1 upon graduation
- 80% of 2+2 graduates in Liverpool who were in further study after graduating from the University of Liverpool were enrolled in QS Top 100 Universities (DHLE 2020, University of Liverpool analysis of unpublished data)
- Ranked 1st in the Russell Group for graduate employability (DLHE 2016/17).

Support services
Happy students are successful students. In order to help you achieve your ambitions, the University of Liverpool has a wide range of services to support you throughout your studies, including:

- XJTLU student adviser
- Academic advisers
- International advice and guidance
- English Language Centre
- Careers Studio
- Student services (Health, Counselling, etc)
- Guild of Students
- Sports centre
- Libraries
- On-campus accommodation.

The university offers great facilities, the 24-hour library, informational Career Centre and the gym. The campus is a very friendly, passionate place with a good balance of studying and socialising.

Siqi Li
2+2 alumna in Communications and Media

EEE and Computer Science *liverpool.ac.uk/electrical-engineering-electronics-and-computer-science/*

Introduction to the School of Electrical Engineering, Electronics and Computer Science at Liverpool

The University of Liverpool School of Electrical Engineering, Electronics and Computer Science is at the forefront of world-leading and internationally acclaimed research. The School brings together two departments which have complementary skills that are in demand worldwide.

This expertise and knowledge is part of our research-led teaching and you will be taught by academics who are leaders in their research fields. Staff in the School are committed to the development of programmes that will further enhance the employability of our students and provide an excellent student experience. The high National Student Survey scores confirm that our students are receiving excellent teaching and a great student experience.

We have strong interdisciplinary collaborations with governments and industrial partners worldwide, meaning we are at the cutting-edge of innovative technologies of the future and our graduates are industry ready.

Summer Abroad
Once you arrive at the University you'll have the opportunity to apply for one of our exciting Summer Abroad programmes. Summer Abroad allows you to visit a new country whilst undertaking worthwhile academic study. Destinations include Australia, France and Canada. Find out more at: **liverpool.ac.uk/study-abroad/outbound/what-is-study-abroad/summer/.**

My favourite part of my course was completing the year two EEE open project with students from different countries. This project provided the right tools and suitable environment for me to come up with individual solutions and designs. It not only fostered my initiative, collaborative, and creative learning, but also taught me that learning is a life-long process that will take place at all times. The team cooperation environment taught me to work with others to achieve a greater outcome than working as an individual. Through this project, I gained the ability to solve the problems outside of what I received from the lectures and classes by doing my research and speaking with experts from other areas.

**Kaixuan Fan
2+2 student in Computer Science and Electronic Engineering**

EEE and Computer Science *liverpool.ac.uk/electrical-engineering-electronics-and-computer-science/*

Computer Science at Liverpool

Ground-breaking developments in computer science have revolutionised our lives. With a seemingly endless demand for new generations of computer scientists to develop apps, algorithms and systems that will continue this revolution, the career prospects for computer science graduates have never been better. Whatever your prior experience of computing, a degree from the University of Liverpool will unlock these opportunities for you and kick-start your career as a computer scientist.

Learn from leading experts in a culture of research excellence

The Department is a Centre of Excellence with respect to teaching and research. The latest Research Excellence Framework rated 97% of our research outputs as being world-leading or internationally excellent, the highest proportion of any computer science department in the UK.

With our close industry partners, and our Russell Group status, we enjoy strong funding from a mixture of European, national and industrial sponsors, providing a balanced portfolio of activity that feeds back into teaching. This helps us ensure our programmes go beyond the practical application of the subject to inspire you about the possibilities of computer science. Thanks to our industry partnerships, we can inject a significant practical element into your degree programme, including project work, placements and career workshops.

Put your learning into practice through industry experience

We offer options of industry-based projects, summer internships and work placements outside study time. You can also take part in the Microsoft IT Academy Programme and qualify for Microsoft certification in Network and IT Systems Administration, Software Development, or Database Administration.

Have confidence for the future with our accredited degree programmes

Our Computer Science programmes have been accredited by the British Computer Society and so open up a wide variety of career opportunities with excellent employment prospects.

Benefit from studying in a well-established department

Computer Science at the University of Liverpool has a history going back to the 1960s. As the subject grew in importance, the Department of Computer Science was established in 1983 to provide learning and research support in this new and exciting field that spans and interplays with more traditional subjects such as mathematics, physics, biology and engineering. After five decades, the Department is still rapidly growing and evolving and remains at the forefront of computer science globally.

We are housed in a grade II listed building which has been extensively refurbished for 21st century needs and challenges and provides state-of-the-art equipment and high-speed communication links. We teach in state-of-the-art PC and Mac laboratories running a variety of different operating systems, as well as iOS and Android tablets to encourage creativity and innovation within a stimulating environment in which to work and study. For those interested in autonomous and robotic systems, we also have dedicated labs where students can build and test their own Lego Mindstorms robots.

Invest in your future

Computer science graduates are among the highest-earners globally: there is a huge demand from industry for computer programmers, data scientists, artificial intelligence researchers, systems analysts, software engineers, technical consultants and web developers. In 2016, six out of the 10 best performing global companies had a focus on information technology.

Over 90% of Liverpool's computer science graduates go onto well-paid graduate jobs and careers such as: computer programmer; software developer; systems analyst; software engineer; technical consultant; web designer.

Recent employers of our graduates

- BAE Systems
- BT
- Guardian Media Group
- Royal Bank of Scotland
- Siemens
- Unilever.

Skills for success

A degree from the Department of Computer Science will prepare you for life with:

- Effective information retrieval, management and organisational skills
- The ability to use general IT facilities effectively
- The ability to manage your own learning and development
- The ability to work effectively as a member of a development team.

Good to know

1st

Ranked 1st in the UK for 4* and 3* research outputs (THE 2014).

94%

are employed or in further study six months after graduation (DLHE 2016/17).

We offer accredited programmes.

We offer the chance to study a language.

bcs
The Chartered Institute for IT

Computer Science *liverpool.ac.uk/computer-science/*

Electrical Engineering and Electronics at Liverpool

Electrical Engineering and Electronics at Liverpool addresses all of the major subject areas underpinning the technology-based modern economy. Whether your interests are in robotics, computers, power systems, communications networks or the internet-of-things, our range of degrees will provide you with industry-relevant training and skills to accelerate your career prospects.

Equip yourself to take advantage of excellent career prospects

We work closely with industry leaders to develop all of our programmes. Building on the core principles of electrical/electronic engineering, you will develop advanced skills in hardware and/or software design and implementation, gaining experience with industry standard tools, technologies and working methods.

Be prepared for the global workplace

We offer outstanding opportunities for our students to experience different systems, technologies and cultures through study abroad placements.

Gain real hands-on experience

You will learn through the practical application of concepts and theory, always with awareness of their relevance to the real world. Working with leading tech companies, you will take projects from conception, through to design, implementation and operation.

Apply for generous scholarships

The Institution of Engineering and Technology (IET) offers generous scholarships worth up to £1,000 per year. More details can be found at **theiet.org/awards**

Thrive within our friendly environment

Our supportive and friendly environment is reflected in our high overall student satisfaction rate (National Student Survey). Your personal development and employability skills are reinforced in the supportive small group environment of our fortnightly tutorial sessions.

Be part of an institution which is leading the way in new technologies

From our Sensor City joint project with Liverpool John Moores University, to the new Centre for Plasma Microbiology, to our pioneering work on cyber security and organic electronics, the work of the Department is leading the way in providing technological solutions to modern problems.

Year Abroad option

Some programmes in Electrical Engineering and Electronics will allow you to apply for a Year Abroad once you arrive at the University of Liverpool. The Year Abroad will allow you to spend an academic year at one of our partner universities, studying a mixture of subject-related classes and classes related to the culture and history of your host country. Find out more at: **liverpool.ac.uk/study-abroad/outbound/what-is-study-abroad/year-abroad/.**

Invest in your future

Our degrees have excellent career prospects: 90% of graduates go on to graduate level jobs. Careers are many and varied and include design engineer, systems engineer, medical physicist, postdoctoral research scientist and radio frequency scientist. Many 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.

Recent employers

- ARM Holdings Ltd
- British Nuclear Group
- Deva Electronic Controls
- Energetix Group PLC
- Ericsson Ltd
- Heap and Partners Ltd
- Logica CMG
- Marconi
- Ministry of Defence
- Royal Liverpool University Hospital (clinical engineering)
- Science and Technology Facilities Council
- Daresbury Laboratory
- Scottish Power
- The Highways Agency
- United Utilities PLC
- Siemens UK.

Extracurricular Opportunities

By participating in the University's Coding and Robotics Club (CRC) teams of students get the opportunity to collaborate and compete in numerous activities from building games to designing and creating robots.

The activities include:
- Designing and building smart cars based on Arduino which could be controlled using a mobile phone or hand gesture controller
- Designing and building TREEE smart cars (line tracing smart cars) developed on the basis of Arduino Nano board
- Training with RoboMaster robots before building a basic RoboMaster structure with remote control
- A race day where the teams pitted their smart cars against each other

The competition offers students the chance to travel to XJTLU to compete with students studying in Suzhou.

Good to know

96% are employed or in further study within six months of graduating (DLHE 2016/17).

We offer accredited programmes.

We offer the chance to study a language.

IET The Institution of Engineering and Technology

Electrical Engineering and Electronics *liverpool.ac.uk/electrical-engineering-and-electronics/*

Articulation routes

Computer Science and Electronic Engineering BEng (Hons)

Smart devices will shape the way we live now and in the future. The rapid pace of technological change and the diversity of modern applications require a broad educational background and a lifelong commitment to learning new and specialised skills.

This programme combines the core elements of Electronic Engineering with those of Computer Science, the intellectual discipline underlying all aspects of software development.

Within this programme, there are two pathways: **Computer Science and Elecrtonic Engineering and Digital Media Technology.**

The **Computer Science and Elecrtonic Engineering (CSEE)** pathway is available to both 2+2 and other UK and international students. This programme provides more of a focus on hardware.

The **Digital Media Technology (DMT)** pathway is only available to 2+2 students. This pathway emphasises software and web technology. Teaching is divided between the Department of Electrical Engineering and Electronics and the Department of Computer Science. Combining elements from these two disciplines will equip you with both an added breadth of knowledge, and greater specialisation. Our graduates are in demand because of their fluency both in the language of electronic engineers as well as that of computer scientists, enabling you to bridge the gap between software systems and the real world.

Programme in detail

Both pathways share many of the modules throughout your two years in Liverpool. The specialisations allow you to concentrate your studies through unique modules.

The second year builds on the first with core modules in **Software engineering**, **Database development**, **Digital electronics** and **Signals and communication systems**. More time is spent in the electronics laboratory doing practical work to consolidate the knowledge learnt in lectures and partaking in an extended team project.

CSEE students take modules in Instrumentation and Control and Distributed Systems in Year Two while DMT students take modules in Artificial Intelligence and App Development.

In your third year CSEE students will take Embedded Computer Systems whlie DMT students take Technologies for E-Commerce, Advanced Web Technology and Principles of Computer Games Design and Implementation. Additionally, you will have the option of selecting advanced modules from either department according to your chosen area of specialisation. Electronics options include **Verilog digital system design, Digital control, Data communications** and **Optical information systems**. Typical computer science options are **Biocomputation**, **Image processing**, **Computer vision and graphics**, **Advanced web technologies** and **e-Commerce technologies**.

Also in the final year, you will undertake a 20-week individual project. Recent projects have included 'real-time GPS tracking of a vehicle fleet by mobile phones', and a 'mobile multi-user dungeon (MUD) game using SMS messaging'.

Key modules
See pages 12-19 for module descriptions.

Computer Science BSc (Hons)

Computer Science with Software Development BSc (Hons)

Computer Science is a broad area which includes designing and building hardware and software systems for a wide range of purposes and processing, structuring and managing various kinds of information.

Covering all aspects of computer science, including the underlying principles and theory, this programme will ensure that when you graduate you will know what is and isn't possible with computers and be able to find solutions to the problems you will encounter in your professional life.

You can choose to maintain a mixture of modules throughout your degree or follow a specialist's pathway in artificial intelligence, algorithms and optimisation or data science.

Computer Science with Software Development is a pathway for those wanting to specialise in development, updating and widespread application of complex software.

Programme in detail
The programme covers a range of compulsory modules including: **Programming in Java**, **Computer systems**, **Databases**, **Software engineering**, **Algorithmic foundations**, **Complexity of algorithms and decision** and **Computation and language**. You then choose from a selection of modules representing the cutting-edge of computer science today. These cover topics such as **Biocomputation**, **Introduction to computational game theory** and **Complex social networks**, amongst others. This degree includes a second year group software project and a final year individual project.

Key modules
Year Two
In Year Two you will continue to expand your knowledge of concepts and skills related to the core areas of software development and database development while starting to engage with subject material directly related to computer science.

You will take four core modules, in addition to selected optional modules.

See pages 12-19 for module descriptions.

Final Year
A major part of your studies in Year Three will be an individual project in computer science that you will undertake. The project will provide you with an opportunity to work in a guided but independent fashion to explore a substantial computer science problem in depth, making practical use of principles, techniques and methodologies acquired elsewhere in the programme.

In addition, you will take a selection of optional modules.

See pages 12-19 for module descriptions.

Electrical and Electronic Engineering BEng (Hons)

Graduates of this degree programme go on to a wide range of careers: you may be responsible for planning the electricity distribution network, or you may be designing the electronics of the next 'must have' item.

However, you are also not limited to a career in engineering, with many employers actively seeking engineers for their mixture of numerical ability and practical problem solving skills. One day per week is timetabled for practical work in our well-equipped modern laboratories during the first year. In the final year you will choose from a wide range of projects that is either linked to research work or has some industrial relevance.

Programme in detail
Modules covered in the second year range from digital electronics and electronic circuits through to electromagnetism and electromechanics.. In the final year you will be able to choose a specialisation from 'electrical engineering', 'electrical and electronic engineering', 'electronic engineering', or 'electronic and communication engineering.'

Electrical engineering
'Electrical engineering' is not simply about producing and transmitting electrical energy, it is also about how it is used. In both its transmission and usage there are significant and increasing challenges facing electrical engineers; many of these are related to sustainability and the environment. Over the last decade there has been an increase in the generation of electrical energy from greener sources (eg wind, wave, solar etc) and more efficient consumer products with increased electronics and software.

Electrical and Electronic Engineering
'Electrical and Electronic Engineering' is the broadest of the four specialisations and will allow you to choose lecture modules from an extensive list of options including subjects as diverse as

Continued over...

Power generation and transmission, **Antennas** and **Digital systems design with verilog**.

Electronics Engineering

The 'electronics' specialisation will prepare you for the world of modern electronics. The Department of Electrical Engineering and Electronics is particularly strong in electronics with research groups in solid state silicon electronics, molecular electronics and bionano electronics. The Department also has excellent links with the electronics industry; for example ARM Ltd, who design the microprocessors that go into 90% of all mobile phones, have supported the Department through donations (from the Founding CEO of ARM plc, Sir Robin Saxby, an electronics graduate from the University of Liverpool), summer work placements, ideas for project work and, most significantly, employment for many recent graduates.

Electronic and Communications Engineering

It is an exciting time for the electronic and communications industry. New and innovative products are coming out every day. The rapid growth of the wireless market is fuelled by technological innovation. The current wireless communication systems include 3G mobile phones, Bluetooth, wireless local area network (WLAN), and Wi-Fi. More exciting wireless systems and technologies (such as WiMAX and 4G) are emerging all the time. This programme is designed for those students with an interest in communications engineering and associated electronics. It covers a wide range of topics in electronic and communications engineering. You will not only learn how a communication system works, but also understand what electronic components are required for such a system.

Key modules
Year Two
See pages 12-19 for module descriptions.

Final Year
You will do a major individual project that is either linked to research work or has some industrial relevance. A very wide range of projects are offered so that you can select one that interests you. Other modules are studied which reflect your personal interest. This provides an opportunity either to focus on your preferred specialisation or to keep your options open with a broad range of suitable modules.

In addition to core modules, you choose two from a list of optional modules.

See pages 12-19 for module descriptions.

Financial Computing BSc (Hons)

Financial computing is at the very heart of the world's global financial centres, from Wall Street to Chicago, London and Tokyo.

Programme in detail
Taught in conjunction with the Management School and bringing together finance, economics and computing, this dynamic programme will develop your knowledge and skills in aspects of financial services from understanding and creating algorithms; financial accounting; designing, implementing and evaluating software systems to analysing stock portfolios and operating financial markets.

Key modules
Year Two
In your first year at Liverpool you continue with a mix of modules related to computing, accounting, economics, finance and management but also have the opportunity to specialise in certain subject areas of your choice. You will take all the core modules, and selected optional modules.

See pages 12-19 for module descriptions.

Final Year
A major part of your studies in Year Three will be the **Honours Year automated trading project** that you take part in as a member of a team. This project allows you to demonstrate practical competence in both research and development of computer-based trading strategies.

In addition, you will take all the core modules listed, and you will also choose modules from selected optional modules list.

See pages 12-19 for module descriptions.

Mechatronics and Robotic Systems BEng (Hons)

Mechatronics and robotic systems involves technologies in mechanical engineering, electronics, electrical engineering, control engineering and computing.

Remotely operated vehicles on Mars, driverless cars and automated robots at manufacturing assembly lines are just some examples of mechatronics and robotic systems.

These products are essentially mechanical in nature but could not function without electrical and computer control systems. There are also numerous automotive applications; modern high performance cars have more than 100 computers hidden in the engine management system, anti-lock brakes, active suspension control and elsewhere. Engineers with experience in mechatronics and robotic systems are therefore in high demand.

Programme in detail
The second year builds on the knowledge you gained at XJTLU with lecture modules covering topics such as **dynamic systems, engineering structures, digital electronics, microprocessor systems and control systems.**

Project work will develop your ability in teamwork, leadership and independent problem solving. In the final year you will take core modules covering the fundamentals of mechatronics and robotic systems. This includes modules covering topics such as **embedded computer systems, drives and industrial robotics.** With the optional modules of your own choice, you can develop your skills in a particular area in which you are interested. The final year includes an individual project.

Key modules
Year Two
See pages 12-19 for module descriptions.

Final Year
You will study both core mechatronics and robotic systems modules and optional modules chosen from a wide ranging list of advanced topics. Also you must undertake an extended individual project eg the development of electronic traction control for automotive applications using a fuzzy logic controller.

See pages 12-19 for module descriptions.

My professors have helped me a lot with my Final Year Project. I appreciate their time and patience so much.

Qingchun Lyu
2+2 alumna in Electrical Engineering and Electronics

Professor Alan Marshall

Professor Alan Marshall holds the chair in Communications Networks at the University of Liverpool where he is director of the Advanced Networks Group. He is a senior member of IEEE and a Fellow of the IET. He has spent over 24 years working in the Telecommunications and Defence Industries. He has published over 200 scientific papers and holds a number of joint patents in the areas of communications and network security. His research interests include Network architectures and protocols; Mobile and Wireless networks; Network Security; high-speed packet switching, Quality of Service & Experience (QoS/QoE) architectures; and Distributed Haptics.

Core and selected optional modules overview Year Two

Module title	CSEE	EEE	DMT	CS	CS w/ SD	FC	MRS	Semester	Credit	Module description
Accounting theory A CFI202						O		2	15	Increases students' knowledge of the theory of accounting and its relevance to the study of accounting practice.
Advanced object oriented C languages COMP282			O	O				2	7.5	Introduces the notion of object orientation and illustrate the differences between unmanaged and managed coding techniques, through the introduction of two object-oriented variants of C; namely C++ and C#.
App Development COMP228			C					2	15	Explores the design and programming of application programs on mobile devices. It covers topics such as how to design for small displays and non-traditional input devices; what the expectations of mobile users are; how to use publicly accessible data sources to develop innovative solutions.
Applied database management COMP283			O	O	O			2	7.5	Utilises Relational Algebra to develop efficient Database Query Language code.
Advanced Artificial intelligence COMP219			C	O	O			1	15	Provides an introduction to the topic of Artificial Intelligence (AI) through studying problem-solving, knowledge representation, planning, and learning in intelligent systems.
Business in the global economy MKIB225						O		2	15	Explores how businesses operate internationally and their changing context.
Classical mechanics MATH228								2	15	Provides an understanding of the principles of classical mechanics and their application to dynamical systems.
CMOS integrated circuits ELEC212		C	C					2	7.5	Combines CMOS integrated circuits design activity with very relevant industrial concepts and a deeper understanding of MOSFET device physical principles and electromagnetism.
Communication systems ELEC202	C	C	C					2	7.5	Presents the concepts involved with signals and communication systems.
Complexity of algorithms COMP202				C				2	15	Demonstrates how the study of algorithmics has been applied in a number of different domains.
Computer aided software development COMP285				O	O			2	7.5	Introduces students to a range of techniques and tools used in modern, large-scale industrial software development.
Computer-based trading in financial markets COMP226				O	O	C		2	15	Develops an understanding of financial markets at the level of individual trades and the range of different computer-based trading applications and techniques.
Computer networks COMP211				O	O			1	15	Introduces networked computer systems and the internet and principles that govern their operation.
Corporate financial management for non-specialist students ACFI213						C		1	15	Provides an introduction to financial markets and to contextualise the application of mathematical techniques.
Database development and design COMP207	C		C	C	C	C		1	15	Introduces students to the problems arising from concurrency in databases, information security considerations and how they are solved.
Decision, computation and language COMP218				O	O			1	15	Examines the importance of automata, formal language theory and mode of computation in computer science and AI.
Digital electronics and microprocessor systems ELEC211	C	C	C				C	2	15	Provides students with the ability to: design digital systems using the Algorithmic State Machine (ASM) methodology.
Distributed systems COMP212 (except G403)	C			O	O			1-2	15	Explores distributed systems including synchronisation models and election algorithms.
Dynamic systems MECH214							C	1-2	15	Develops an understanding of the essential principles governing the behaviour and concepts of feedback control and dynamic stability.
E-commerce group project COMP215							C	2	15	Students will work in small groups to produce a working software system.

Key: **C**: Core **O**: Selected optional modules **CSEE:** Computer Science and Electrical Engineering Pathway **DMT:** Digital Media Technology Pathway **EEE:** Electrical and Electronic Engineering **CS:** Computer Science **CS w/ SD:** Computer Science with Software Development **FC:** Financial Computing

Core and selected optional modules overview Year Two (continued)

Module title	CSEE	EEE	DMT	CS	CS w/ SD	FC	MRS	Semester	Credit	Module description
Electrical circuits and power systems ELEC209		C	C				C	1	15	Equips students with tools to analyse inter-related circuits.
Electromagnetics ELEC210		C	C					2	7.5	To further enhance the students knowledge and use of Maxwells equations and their use in practical EM applications.
Electronic circuits and systems ELEC271	C	C	C					2	15	Understand how electronic circuits are designed and undertake design exercises.
Field theory and partial differential equations MATH283		C	C					1	7.5	Introduces students to the concepts of scalar and vector fields.
Financial reporting I ACFI201						C		1	15	Enables candidates to prepare single entity financial statements, and extracts, covering a wide range of International Financial Reporting Standards (IFRS).
Group software project COMP208				C	C			2	15	Students will work in small groups to produce a working software system.
Instrumentation and control ELEC207	C	C	C				C	1 and 2	15	Provides the student with the ability to select a suitable transducer and associated system for a given measurement application and to consider possible alternative solutions.
Planning your career COMP221				O	O	O		1	7.5	Prepares students with the skills required to secure either an internship or a graduate job.
Principles of C and memory management COMP281				O	O			2	7.5	Introduces the issues of memory and memory management within system-level procedural programming language (C).
Principles of computer games design and implementation COMP222	C			O	O			2	15	Introduces the main issues surrounding the computer games architecture.
Project, problem solving and industrial awareness ELEC222	C						C	1 and 2	7.5	Provides students with practical work, while testing a wide range of skills.
Robotic Systems I ELEC230					C					
Scripting languages COMP284				O	O	O		2	7.5	Provides an understanding of the nature and role of scripting languages.

Module title	CSEE	EEE	DMT	CS	CS w/ SD	FC	MRS	Semester	Credit	Module description
Securities markets ECON241						C		2	15	Develops an appreciation of the role of securities markets in the economy.
Signals and systems ELEC270	C	C	C				C	1	15	The fundamentals of the analysis of continuous- and discrete-time signals and systems.
Software development tools COMP220				O	C			2	15	Introduces a range of techniques and tools, beginning to be used in modern, large-scale industrial software development.
Software engineering I COMP201	C			C	C	C		1	15	Develops an understanding of the problems associated with the development of significant computing systems.
Solids and structures II ENGG209							C	1 and 2	15	Develops knowledge of the principles of solid mechanics applied to engineering structures.

Please note: modules are illustrative only and subject to change.

Continued over...

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Key: C: Core **O**: Selected optional modules   **CSEE:** Computer Science and Electrical Engineering Pathway **DMT:** Digital Media Technology Pathway **EEE:** Electrical and Electronic Engineering **CS:** Computer Science **CS w/ SD:** Computer Science with Software Development **FC:** Financial Computing

Core and selected optional modules overview Year Three

Module title	CSEE	EEE	DMT	CS w/ SD	FC	MRS	Semester	Credit	Module description
Advanced modern management MNGT352	O	O			O		1	7.5	Various aspects of advanced modern management.
Advanced Web Technology COMP318			C				2	15	Provides a basic introduction to the main principles behind representing and retrieving knowledge effectively on the Web. The module covers the evolution from the standard Web to the Semantic Web, and gives the opportunity to gain an awareness of the main methods and techniques, including practical awareness, of the main issues arising in annotating web pages with semantic information, in interlinking pages with similar semantic content and in effectively querying these pages.
Antennas ELEC312	O	O			O		2	7.5	Introduces fundamental antenna principles and concepts based on the underlying electromagnetic theory.
Application development with C++ ELEC362	C	O			O		1	15	Provides students with the ability to design and implement a console-based application using C++.
Biocomputation COMP305	O		O	O			1	15	Introduces students to the field of neural computation with regard to biologically-motivated computing particularly in relation to multidisciplinary research.
Communicating computer science COMP335			O	O			1 and 2	15	Develops key transferable skills including communication and team working within an educational context.
Complex information networks COMP324			O	O			2	15	Understand the software development opportunities offered by the emergence of these networks, through the study of information retrieval algorithms.
Computational game theory and mechanism design COMP326			O	O	O		2	15	An understanding of the inefficiency arising from uncontrolled, decentralised resource allocation.
Corporate reporting and analysis ACFI302					O		2	15	Develops students understanding of financial reporting to an advanced level.
Digital and wireless communications ELEC377	O	O			O		1	15	Provides an extensive coverage of the theory and practice of digital and wireless communication systems.
Digital control and optimisation ELEC303	O	O			C		2	15	The fundamentals of applied digital control and design techniques.
Digital system design ELEC373	O	O			O		1 and 2	15	Students design and synthesise digital systems using Verilog and ASM.

Module title	CSEE	EEE	DMT	CS w/ SD	FC	MRS	Semester	Credit	Module description
Drives ELEC331	O	O			C		1	7.5	Introduces a range of electrical machines (AC & DC) using the concepts of rotating magnetic fields and co-energy.
E-business models and strategy EBUS301					O		1	15	An introduction to the appraisal and formulation of e-business strategy and contemporary e-business models.
Efficient sequential algorithms COMP309			O	O			1	15	Learn some advanced topics in the design and analysis of efficient sequential algorithms.
Electromagnetic compatibility ELEC382	O	O			O		2	7.5	Provides students with advanced knowledge and skills to deal with EMC problems.
Electronics for instrumentation and communications ELEC317	O	O			O		2	15	Gain knowledge of a wide range of analogue components and electronics for instrumentation and communications.
Embedded computer systems ELEC370	C	O	O		C		1	15	Obtain an understanding of the construction and operation of embedded computer systems and their components.
Engineering management and entrepreneurial skills ELEC352	C	C	C				1	7.5	Explores the tools and constraints associated with managing both small and large projects.
Engineering systems MECH310					C		1	7.5	Develops an appreciation of the multidisciplinary systems view in engineering.
Finance and markets ACFI341					C		2	15	Builds on the existing finance modules, understanding the recent global financial crisis and risk management.
Financial reporting II ACFI309					O		1	15	Covering the preparation of group financial statements including associates and joint ventures.
Formal methods COMP313	O	O	O	O			2	15	Exploring complex computational systems within critical applications to give a precise and unambiguous specifications.
Global strategic management MKIB351					O		1	15	Provides conceptual frameworks within which to formulate and analyse global strategy.
Honours Year automated trading project COMP396					C		1 and 2	30	Gives students the opportunity to work in a team to explore the problem of automated trading from a practical perspective.

Please note: modules are illustrative only and subject to change.

Continued over...

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Core and selected optional modules overview Year Three (continued)

Module title	CSEE	EEE	DMT	CS w/ SD	FC	MRS	Semester	Credit	Module description
Honours Year computer science project COMP390	C		C	C			1 and 2	30	Students work in a guided but independent fashion to explore a substantial electronic commerce problem in depth.
Image processing ELEC319	O	O	O	O		O	1	7.5	Introduces the basic concepts of digital image processing and pattern recognition.
Industrial robotics and automated assembly MNFG309						C	2	15	Develops knowledge and skills to design, build and operate industrial robotic systems.
Introduction to computational game theory COMP323	O		O	O	C		1	15	Introduces the notion of a game, its solutions, concepts, and other basic notions and tools of game theory.
Knowledge representation and reasoning COMP304			O	O			1	15	Develops a complete and critical understanding of the notion of representation languages and logics.
BEng project ELEC340		C				C	1 and 2	30	The project provides experience of all aspects of working as an individual engineer to complete a relatively complex engineering task.
Mobile computing COMP327			O	O			1	15	Explores guidelines, design principles and experience in developing applications for small, mobile devices, including an appreciation of context and location aware services.
Multi-agent systems COMP310	O		O	O	O		2	15	Introduces the concept of an agent and multi-agent systems, and the main applications for which they are appropriate.
Neural networks ELEC320	C	O	C	O		O	2	7.5	Understand the structures and the learning mechanisms underlying neural networks within the field of artificial intelligence.
Ontologies and semantic web COMP318			O	O			2	15	Examine guidelines, concepts and models for designing and evaluating applications utilising advanced web technologies.
Optimisation COMP331			O	O	O		1	15	A foundation for modelling various continuous and discrete optimisation problems.
Organic electronics ELEC324	O	O				O	1	7.5	Explore new developments in large-area, low-cost and flexible electronics, particularly those relating to the use of conjugated polymer and fullerene-based compounds and composites.
Photonics and optical information systems ELEC313	O	O					1	15	Introduces the fundamental principles of opto/electronic systems for the transfer of information.

Module title	CSEE	EEE	DMT	CS w/ SD	FC	MRS	Semester	Credit	Module description
Principle of computer games design and implementation COMP222			C				2	15	Introduces topics commonly present in the modern computer games from software architecture principles to advanced artificial intelligence techniques to the creation of 3D content. As part of the continuous assessment, students create a simple 3D video game using an existing game engine and an AI control procedure for a multiuser framework.
Quantitative business finance ACFI314					C		1	15	Develops understanding of the core theoretical and empirical aspects involved in corporate finance.
RF engineering and applied electromagnetics ELEC311	O	O				O	1	7.5	Examines the concepts of high frequency electromagnetics.
Robotics and autonomous systems COMP329			O	O			1	15	Introduces the concept of an autonomous agent.
Robotic Systems II ELEC330					C				
Signal processing and digital filtering ELEC309	O	O	O			O	2	15	Students develop a framework for signal processing and to demonstrate some applications.
Software engineering II COMP319	O		O	O	O		1	15	Examine a range of advanced, near-research level topics in contemporary software engineering.
Technologies for e-commerce COMP315	C	O	C	O	C		2	15	Explores the environment in which e-commerce takes place, the main technologies for supporting e-commerce, and how these technologies fit together.

Computer science can be either very theoretical or very down to earth - applying things without knowing the actual theories behind them. I am glad the courses I take at UoL have a great balance between these two parts. I like the way the teacher teach. They are always very patient to answer questions (either after class or in the discussion board) and deliver the contents using animation or examples. Last but not least, I think students here participate more in the class room and the atmosphere is quite welcoming and inspiring.

Yiting Wang
2+2 alumni in Computer Science

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Please note: modules are illustrative only and subject to change.

Key: C: Core O: Selected optional modules   **CSEE:** Computer Science and Electrical Engineering Pathway **DMT:** Digital Media Technology Pathway **EEE:** Electrical and Electronic Engineering **CS:** Computer Science **CS w/ SD:** Computer Science with Software Development **FC:** Financial Computing

Student support and next steps

As a student in the School of Electrical Engineering, Electronics and Computer Science, you will find a dedicated student support team, offering guidance and advice all the way from enrolment through to your graduation.

Learning and Teaching Support

Every student is allocated an Academic Adviser who provides academic advice and guidance to support your academic progress. You will find your Academic Adviser via Liverpool Life Portal and they will meet you when you begin your studies and regular meetings will be available throughout your programme to discuss and review your progress.

Careers and Employability

The My Liverpool interactive resource is a website where students can find out about a wide range of extra-curricular activities including CV enhancing activities which will give the opportunity to reflect on the skills developed. Activities from the My Liverpool Portfolio will populate the Higher Education Achievement Reports (HEARs).

Disability Support

The University offers Disability Advice and Guidance to disabled students with individual needs.

There are two Disability Support Officers within the School of EEE/CS who can offer guidance to students with disabilities or via the Student Support Offices.

Steps for Registration

Invitations for registration will appear in the Welcome week timetable of events and sent to you before your arrival in September.

If you have questions once you arrive, you can visit the student support teams for assistance:

For the Computer Science and Electronic Engineering, Electrical and Electronic Engineering & Mechatronics and Robotic Systems programmes, you can visit the Student Support Office, 5th floor, Dept of EEE.

For the Computer Science, Computer Science with Software Development and Financial Computing Programmes, you can visit the Student Support Office, Ground floor, Dept of CS.

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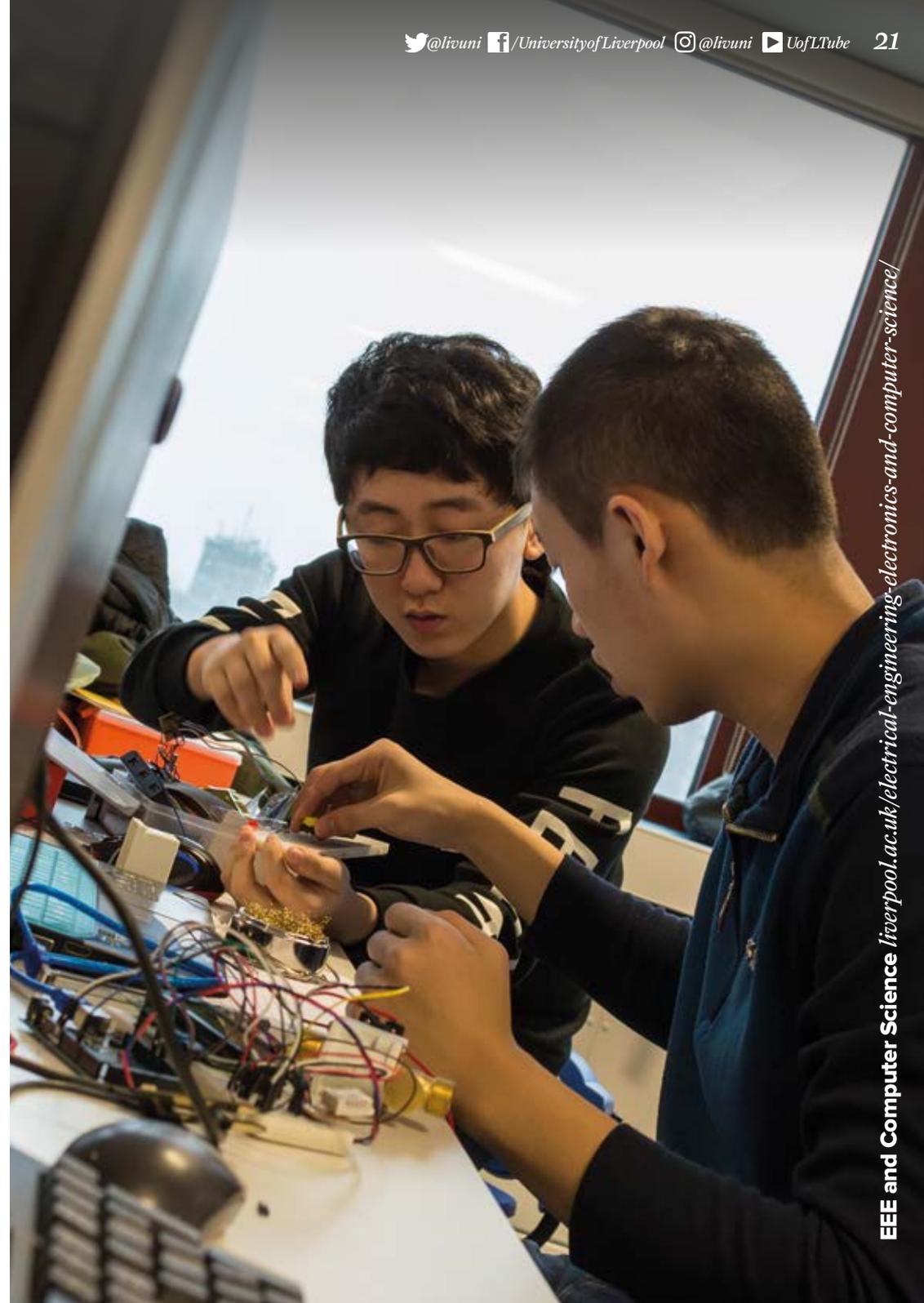
Find out more
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Life in Liverpool: **liverpool.ac.uk/study/undergraduate/welcome-to-liverpool**
Student Welfare Advice and Guidance: **liverpool.ac.uk/studentsupport**
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Information provided is correct at time of going to press and is subject to change.