Electrical Engineering, Electronics and Computer Science

2+2
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 to success. Studying in Liverpool will provide you with an amazing, life-changing university experience that will help you to achieve your ambitions.

Internationally recognised
- Ranked 181st in the QS World University Rankings (2021)
- Ranked 101-150 in the Academic Ranking World Universities (2021)
- 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
- You may not need to take an IELTS when applying for postgraduate study at some universities in the UK
- Opportunity to explore the UK and Europe.

Graduate outcomes for 2+2 students
- 87% 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the University of Liverpool were enrolled in QS Top 100 Universities (DHLE 2020, University of Liverpool analysis of unpublished data)
- One of the top 25 UK universities targeted by leading graduate employers (High Fliers 2020).

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:
  - Academic advisors
  - International advice and guidance
  - English Language Centre
  - Careers Studio
  - Student services (Health, Counselling, etc)
  - Guild of Students
  - Sports and Fitness 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
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 alumni in Computer Science and Electronic Engineering
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.

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.

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.

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.

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.

We offer accredited programmes.

We offer the chance to study a language.

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- 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.
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.
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 underpinning all aspects of software development.

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

The Computer Science and Electronic 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 while 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 Bio-computation, 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 Bio-computation, 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 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, Electronic and electrical 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 (e.g 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...
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.

Please note: If you are progressing to BSc Financial Computing from BSc Information Management and Information Systems, you must take ACC107 at XJTLU to be eligible for the articulation route.

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.
# Core and selected optional modules overview Year Two

<table>
<thead>
<tr>
<th>Module title</th>
<th>CSEE</th>
<th>EEE</th>
<th>DMT</th>
<th>CS w/ SD</th>
<th>FC</th>
<th>MRS</th>
<th>Semester</th>
<th>Credit</th>
<th>Module description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting theory A</td>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>15</td>
<td>Increases students' knowledge of the theory of accounting and its relevance to the study of accounting practice.</td>
</tr>
<tr>
<td>Advanced object oriented C languages COMP282</td>
<td>O</td>
<td>O</td>
<td>2</td>
<td>7.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>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#.</td>
</tr>
<tr>
<td>Applied database management COMP283</td>
<td>O</td>
<td>O</td>
<td>2</td>
<td>7.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Utilises Relational Algebra to develop efficient Database Query Language code.</td>
</tr>
<tr>
<td>Advanced Artificial intelligence COMP219</td>
<td>C</td>
<td>O</td>
<td>O</td>
<td></td>
<td></td>
<td>1</td>
<td>15</td>
<td>Provides an introduction to the topic of Artificial Intelligence (AI) through studying problem-solving, knowledge representation, planning, and learning in intelligent systems.</td>
<td></td>
</tr>
<tr>
<td>Business in the global economy MKIB225</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>15</td>
<td>Explores how businesses operate internationally and their changing context.</td>
</tr>
<tr>
<td>Classical mechanics MATH228</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>15</td>
<td>Provides an understanding of the principles of classical mechanics and their application to dynamical systems.</td>
<td></td>
</tr>
<tr>
<td>CMOS integrated circuits ELEC212</td>
<td>C</td>
<td></td>
<td></td>
<td>2</td>
<td>7.5</td>
<td></td>
<td></td>
<td></td>
<td>Combines CMOS integrated circuits design activity with very relevant industrial concepts and a deeper understanding of MOSFET device physical principles and electromagnetism.</td>
</tr>
<tr>
<td>Communication systems ELEC202</td>
<td>C</td>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>7.5</td>
<td>Presents the concepts involved with signals and communication systems.</td>
<td></td>
</tr>
<tr>
<td>Complexity of algorithms COMP202</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>15</td>
<td>Demonstrates how the study of algorithms has been applied in a number of different domains.</td>
<td></td>
</tr>
<tr>
<td>Computer aided software development COMP285</td>
<td>O</td>
<td>O</td>
<td></td>
<td></td>
<td>2</td>
<td>7.5</td>
<td></td>
<td></td>
<td>Introduces students to a range of techniques and tools used in modern, large-scale industrial software development.</td>
</tr>
<tr>
<td>Computer-based trading in financial markets COMP226</td>
<td>O</td>
<td>O</td>
<td>C</td>
<td></td>
<td></td>
<td>2</td>
<td>15</td>
<td>Develops an understanding of financial markets at the level of individual trades and the range of different computer-based trading applications and techniques.</td>
<td></td>
</tr>
<tr>
<td>Computer networks COMP211</td>
<td>O</td>
<td>O</td>
<td></td>
<td></td>
<td>1</td>
<td>15</td>
<td>Introduces networked computer systems and the internet and principles that govern their operation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corporate financial management for non-specialist students ACFI213</td>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>15</td>
<td>Provides an introduction to financial markets and to contextualise the application of mathematical techniques.</td>
<td></td>
</tr>
<tr>
<td>Cyber Security COMP232</td>
<td>O</td>
<td>O</td>
<td></td>
<td></td>
<td>2</td>
<td>15</td>
<td>Provides students with an understanding of the main problems in security, confidentiality and privacy in computers and in networks, and the reasons for their importance.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Database development and design COMP207</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>1</td>
<td>15</td>
<td>Introduces students to the problems arising from concurrency in databases, information security considerations and how they are solved.</td>
<td></td>
</tr>
<tr>
<td>Decision, computation and language COMP218</td>
<td>O</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>15</td>
<td>Examines the importance of automata, formal language theory and mode of computation in computer science and AI.</td>
<td></td>
</tr>
<tr>
<td>Digital electronics and microprocessor systems ELEC211</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td></td>
<td></td>
<td>2</td>
<td>15</td>
<td>Provides students with the ability to: design digital systems using the Algorithmic State Machine (ASM) methodology.</td>
<td></td>
</tr>
<tr>
<td>Distributed systems COMP212 (except G403)</td>
<td>C</td>
<td>O</td>
<td>O</td>
<td></td>
<td></td>
<td>1-2</td>
<td>15</td>
<td>Explores distributed systems including synchronisation models and election algorithms.</td>
<td></td>
</tr>
<tr>
<td>Dynamic systems MECH214</td>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1-2</td>
<td>15</td>
<td>Develops an understanding of the essential principles governing the behaviour and concepts of feedback control and dynamic stability.</td>
<td></td>
</tr>
<tr>
<td>E-commerce group project COMP215</td>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>15</td>
<td>Students will work in small groups to produce a working software system.</td>
<td></td>
</tr>
</tbody>
</table>

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

## Core and selected optional modules overview Year Two (continued)

<table>
<thead>
<tr>
<th>Module title</th>
<th>CSEE</th>
<th>EEE</th>
<th>DMT</th>
<th>CS w/ SD</th>
<th>FC</th>
<th>MRS</th>
<th>Semester</th>
<th>Credit</th>
<th>Module description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical circuits and power systems ELEC209</td>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>15</td>
<td>Equips students with tools to analyse inter-related circuits.</td>
</tr>
<tr>
<td>Electromagnetics ELEC210</td>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>7.5</td>
<td>To further enhance the students knowledge and use of Maxwells equations and their use in practical EM applications.</td>
</tr>
<tr>
<td>Electronic circuits and systems ELEC271</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>15</td>
<td>Understand how electronic circuits are designed and undertake design exercises.</td>
</tr>
<tr>
<td>Field theory and partial differential equations MATH283</td>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>7.5</td>
<td>Introduces students to the concepts of scalar and vector fields.</td>
</tr>
<tr>
<td>Financial reporting I ACFI201</td>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>15</td>
<td>Enables candidates to prepare single entity financial statements, and extracts, covering a wide range of International Financial Reporting Standards (IFRS).</td>
</tr>
<tr>
<td>Group software project COMP208</td>
<td>C</td>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>15</td>
<td>Students will work in small groups to produce a working software system.</td>
</tr>
<tr>
<td>Instrumentation and control ELEC207</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>1 and 2</td>
<td></td>
<td></td>
<td></td>
<td>15</td>
<td>Provides the students with the ability to select a suitable transducer and associated system for a given measurement application and to consider possible alternative solutions.</td>
</tr>
<tr>
<td>Introduction to Data Science COMP229</td>
<td>O</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>15</td>
<td>Provides a foundation and overview of modern problems in Data Science. Describes the tools and approaches for the design and analysis of algorithms for data clustering, dimensionally reduction, graph reconstruction from noisy data.</td>
</tr>
<tr>
<td>Planning your career COMP221</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>7.5</td>
<td>Prepares students with the skills required to secure either an internship or a graduate job.</td>
</tr>
<tr>
<td>Principles of C and memory management COMP281</td>
<td>O</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>7.5</td>
<td>Introduces the issues of memory and memory management within system-level procedural programming language (C).</td>
</tr>
<tr>
<td>Principles of computer games design and implementation COMP222</td>
<td>C</td>
<td>O</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>15</td>
<td>Introduces the main issues surrounding the computer games architecture.</td>
</tr>
</tbody>
</table>

**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

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*Please note: modules are illustrative only and subject to change.*
# Core and selected optional modules overview Year Three

<table>
<thead>
<tr>
<th>Module title</th>
<th>CSEE</th>
<th>EEE</th>
<th>DMT</th>
<th>CS w/ SD</th>
<th>FC</th>
<th>MRS Semester</th>
<th>Credit</th>
<th>Module description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced modern management MNGT352</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>1</td>
<td>75</td>
<td>Various aspects of advanced modern management.</td>
<td></td>
</tr>
<tr>
<td>Advanced web technology COMP318</td>
<td>C</td>
<td>2</td>
<td>15</td>
<td>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.</td>
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<td></td>
</tr>
<tr>
<td>Antennas ELEC312</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>2</td>
<td>75</td>
<td>Introduces fundamental antenna principles and concepts based on the underlying electromagnetic theory.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application development with C++ ELEC362</td>
<td>C</td>
<td>O</td>
<td>C</td>
<td>O</td>
<td>1</td>
<td>15</td>
<td>Provides students with the ability to design and implement a console-based application using C++.</td>
<td></td>
</tr>
<tr>
<td>Big data analytics COMP336</td>
<td>O</td>
<td>O</td>
<td>1</td>
<td>15</td>
<td>Introduces the students to middleware often used in Big Data analytics.</td>
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<td></td>
</tr>
<tr>
<td>Biocomputation COMP305</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>1</td>
<td>15</td>
<td>Introduces students to the field of neural computation with regard to biologically-motivated computing particularly in relation to multidisciplinary research.</td>
<td></td>
</tr>
<tr>
<td>Communicating computer science COMP335</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>1 and 2</td>
<td>15</td>
<td>Develops key transferable skills including communication and team working within an educational context.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complex information networks COMP324</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>2</td>
<td>15</td>
<td>Understand the software development opportunities offered by the emergence of these networks, through the study of information retrieval algorithms.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computational game theory and mechanism design COMP326</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>2</td>
<td>15</td>
<td>An understanding of the inefficiency arising from uncontrolled, decentralised resource allocation.</td>
<td></td>
</tr>
<tr>
<td>Computer forensics COMP343</td>
<td>O</td>
<td>O</td>
<td>2</td>
<td>15</td>
<td>Provides a firm foundation to the field of information retrieval. Develops an systematic understanding of the theory and practice of computer forensics.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Corporate reporting and analysis ACFI302</td>
<td>O</td>
<td>2</td>
<td>15</td>
<td>Develops students understanding of financial reporting to an advanced level.</td>
<td></td>
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</tr>
<tr>
<td>Digital and wireless communications</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>1</td>
<td>15</td>
<td>Provides an extensive coverage of the theory and practice of digital and wireless communication systems.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital control and optimisation ELEC303</td>
<td>O</td>
<td>O</td>
<td>C</td>
<td>2</td>
<td>15</td>
<td>The fundamentals of applied digital control and design techniques.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital system design ELEC373</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>1 and 2</td>
<td>15</td>
<td>Students design and synthesise digital systems using Verilog and ASM.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module title</th>
<th>CSEE</th>
<th>EEE</th>
<th>DMT</th>
<th>CS w/ SD</th>
<th>FC</th>
<th>MRS Semester</th>
<th>Credit</th>
<th>Module description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drives ELEC331</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>C</td>
<td>1</td>
<td>75</td>
<td>Introduces a range of electrical machines (AC &amp; DC) using the concepts of rotating magnetic fields and co-energy.</td>
<td></td>
</tr>
<tr>
<td>E-business models and strategy EBUS301</td>
<td>O</td>
<td>1</td>
<td>15</td>
<td>An introduction to the appraisal and formulation of e-business strategy and contemporary e-business models.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efficient sequential algorithms COMP309</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>1</td>
<td>15</td>
<td>Learn some advanced topics in the design and analysis of efficient sequential algorithms.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electromagnetic compatibility ELEC382</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>2</td>
<td>75</td>
<td>Provides students with advanced knowledge and skills to deal with EMC problems.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electronics for instrumentation and communications ELEC317</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>2</td>
<td>15</td>
<td>Gain knowledge of a wide range of analogue components and electronics for instrumentation and communications.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Embedded computer systems ELEC370</td>
<td>C</td>
<td>O</td>
<td>O</td>
<td>C</td>
<td>1</td>
<td>15</td>
<td>Obtain an understanding of the construction and operation of embedded computer systems and their components.</td>
<td></td>
</tr>
<tr>
<td>Engineering management and entrepreneurial skills ELEC392</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>O</td>
<td>O</td>
<td>1</td>
<td>15</td>
<td>Explores the tools and constraints associated with managing both small and large projects.</td>
</tr>
<tr>
<td>Engineering systems MECH310</td>
<td>C</td>
<td>1</td>
<td>15</td>
<td>Develops an appreciation of the multidisciplinary systems view in engineering.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Finance and markets ACFI341</td>
<td>C</td>
<td>2</td>
<td>15</td>
<td>Builds on the existing finance modules, understanding the recent global financial crisis and risk management.</td>
<td></td>
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</tr>
<tr>
<td>Financial reporting II ACFI309</td>
<td>O</td>
<td>1</td>
<td>15</td>
<td>Covering the preparation of group financial statements including associates and joint ventures.</td>
<td></td>
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</tr>
<tr>
<td>Formal methods COMP313</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>2</td>
<td>15</td>
<td>Exploring complex computational systems within critical applications to give a precise and unambiguous specifications.</td>
</tr>
<tr>
<td>Global strategic management MKIB351</td>
<td>O</td>
<td>1</td>
<td>15</td>
<td>Provides conceptual frameworks within which to formulate and analyse global strategy.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>High performance computing COMP328</td>
<td>O</td>
<td>O</td>
<td>2</td>
<td>15</td>
<td>For students to understand the motivation and opportunities of high performance computing, and to have sufficient understanding of topics in order to use HPC facilities.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Honours Year automated trading project COMP396</td>
<td>C</td>
<td>1 and 2</td>
<td>30</td>
<td>Gives students the opportunity to work in a team to explore the problem of automated trading from a practical perspective.</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Please note: modules are illustrative only and subject to change.
Core and selected optional modules overview Year Three (continued)

<table>
<thead>
<tr>
<th>Module title</th>
<th>CSEE</th>
<th>EEE</th>
<th>DMT</th>
<th>CS</th>
<th>w/ SD</th>
<th>FC</th>
<th>MRS</th>
<th>Semester</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Honours Year computer science project COMP390</td>
<td>C*</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>1 and 2</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Image processing ELEC319</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>1</td>
<td>7.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial robotics and automated assembly MNFG309</td>
<td>C</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction to computational game theory COMP323</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>C</td>
<td>1</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge representation and reasoning COMP304</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>1</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BEng project ELEC340</td>
<td>C*</td>
<td>C</td>
<td>C</td>
<td>1 and 2</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobile computing COMP327</td>
<td>C</td>
<td>O</td>
<td>1</td>
<td>15</td>
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</tr>
<tr>
<td>Multi-agent systems COMP310</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>D</td>
<td>2</td>
<td>15</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Neural networks ELEC320</td>
<td>C</td>
<td>O</td>
<td>C</td>
<td>O</td>
<td>O</td>
<td>2</td>
<td>7.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ontologies and semantic web COMP318</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>2</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Optimisation COMP331</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>1</td>
<td>15</td>
<td></td>
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</tr>
<tr>
<td>Photonics and optical information systems ELEC310</td>
<td>O</td>
<td>O</td>
<td>1</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Principle of computer games design and implementation COMP222</td>
<td>C</td>
<td>2</td>
<td>15</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Quantitative business finance ACFD314</td>
<td></td>
<td>C</td>
<td>1</td>
<td>15</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RF engineering and applied electromagnetics ELEC341</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>1</td>
<td>7.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Robot and autonomous systems COMP329</td>
<td>O</td>
<td>O</td>
<td>1</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Robotic Systems II ELEC330</td>
<td>C</td>
<td>1 and 2</td>
<td>15</td>
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</tr>
<tr>
<td>Signal processing and digital filtering ELEC309</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>2</td>
<td>15</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Software engineering II COMP319</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>1</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technologies for e-commerce COMP315</td>
<td>C</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>C</td>
<td>2</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

*Students can choose to take either COMP390 or ELEC340 for a final year project.

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 C w/ SD: Computer Science with Software Development FC: Financial Computing

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

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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 teachers 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
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 Advisor who provides academic advice and guidance to support your academic progress. You will find your Academic Advisor via Liverpool Life, the University’s information portal for current students, 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, Department of Computer Science.
Find out more
liverpool.ac.uk/study

Accommodation: liverpool.ac.uk/accommodation
Fees and student finance: liverpool.ac.uk/money
Life in Liverpool: liverpool.ac.uk/study/undergraduate/welcome-to-liverpool
Student Welfare Advice and Guidance: liverpool.ac.uk/studentsupport
@livuni_eeecs

Enquiries
Two Plus Two Team
two-plus-two@xjtlu.edu.cn

Computer Science
The University of Liverpool
Ashton Building, Ashton Street
Liverpool L69 3BX
liverpool.ac.uk/computer-science

Information provided is correct at time of going to press and is subject to change.

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