# PROGRAMME SPECIFICATION

## Bachelor of Science with Honours in Computing and Smart Devices

| | |
|---|---|
| **Awarding institution** | Liverpool John Moores University |
| **Teaching institution** | LJMU |
| **UCAS Code** | F217 |
| **JACS Code** | H610 |
| **Programme Duration** | Full-Time: 3 Years, Sandwich Thick: 4 Years |
| **Language of Programme** | All LJMU programmes are delivered and assessed in English |
| **Subject benchmark statement** | Engineering Council UK Spec |
| **Programme accredited by** | |
| **Description of accreditation** | |
| **Validated target and alternative exit awards** | Bachelor of Science with Honours in Computing and Smart Devices<br><br>Bachelor of Science with Honours (SW) in Computing and Smart Devices<br><br>Diploma of Higher Education in Computing and Smart Devices<br><br>Diploma in Higher Education (SW) in Computing and Smart Devices<br><br>Certificate of Higher Education in Computing and Smart Devices |
| **Programme Leader** | Michael Shaw |

# Educational aims of the programme

The BSc programme in Computing & Smart Devices has been designed to fulfil the educational, knowledge and understanding requirements for IEng registration of the Engineering Council Register. It is designed to develop a high level of technical expertise together with the emotional intelligence to be able to practice successfully as a professional engineer in a modern interdisciplinary engineering environment. Engineers are increasingly expected to take on important technical leadership and management responsibilities early in their careers and the knowledge and skills gained from this programme is designed to produce graduates who are able to make an immediate impact to their employers' organisations.

Graduates of this programme should be able to:

Use a combination of general and specialist knowledge and understanding in the context of existing and emerging technology.

Apply appropriate practical methods to design, develop, manufacture and integrate electronic, embedded communication and computerised systems into a seamlessly operating environment applicable to modern day devices and industrial applications.

Demonstrate knowledge and understanding of technical and commercial management.

Demonstrate effective communication and interpersonal skills.

Demonstrate an understanding of professional and ethical standards and recognise obligations to society, the profession and the environment.

Additionally for sandwich students, the programme will provide first hand knowledge and experience of the practice and application of Computing & Smart Devices in UK and European industry.

**Alternative Exit/ Interim Award Learning Outcomes - Certificate of Higher Education**

*A student who is eligible for this award will be able to:*

Apply fundamental knowledge and acquire the key skills required for the Certificate of Higher Education.

Acquire and apply the fundamental mathematical knowledge sufficient to underpin the study of the technical modules within the programme.

Apply the fundamental principles of electrical and electronic circuits, computer technology and programming to simplified engineering problems.

Simulate, construct and test simple circuits and systems incorporating computer technology and embedded systems.

Write and test simple programmes to drive computerised systems.

Demonstrate key skills appropriate to the professional technologist.

**Alternative Exit/ Interim Award Learning Outcomes - Diploma in Higher Education (SW)**

*A student who is eligible for this award will be able to:*

In addition to the learning outcomes listed for Diploma of Higher Education, students who obtain the alternative Diploma of Higher Education (SW) target award will also gain experience in the application of skills and knowledge in a work environment through the satisfactory completion of an approved industrial placement.

**Alternative Exit/ Interim Award Learning Outcomes - Diploma of Higher Education**

*A student who is eligible for this award will be able to:*

Demonstrate greater subject knowledge and a deeper understanding of the core principles expected from a professional technologist working in the computing and smart devices arena.

Undertake further programming and electronics study associated with engineering and computerised systems and their associated problems.

Demonstrate the application and understanding of more complex design of electronics, programming, networking and integrated systems to the solution of engineering problems.

Demonstrate the intermediate technologist skills that will be required for effective further study.

Demonstrate a clear understanding of the economic, legal, social, ethical and environmental contexts of engineering development and activity.

# Target award Learning Outcomes - Bachelor of Science with Honours

*A student successfully completing the programme of study will have acquired the following subject knowledge and understanding as well as skills and other attributes.*

*A student who is eligible for this award will be able to:*

1. Apply knowledge and understanding of the scientific principles underpinning relevant current technologies and their evolution.

2. Apply knowledge and understanding of mathematics and an awareness of statistical methods necessary to support application of key engineering principles.

3. Monitor, interpret and apply the results of analysis and modelling in order to bring about continuous improvement.

4. Apply quantitative methods in order to understand the performance of systems and components.

5. Use the results of engineering analysis to solve engineering problems and to recommend appropriate action.

6. Apply an integrated or systems approach to engineering problems through know-how of the relevant technologies and their application.

7. Demonstrate an awareness of business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics.

8. Define a problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards.

9. Work with information that may be incomplete or uncertain and be aware that this may affect the design.

10. Apply problem-solving skills, technical knowledge and understanding to create or adapt design solutions that are fit for purpose including operation, maintenance, reliability etc.

11. Manage the design process, including cost drivers and evaluate outcomes.

12. Communicate their work to technical and non-technical audiences.

13. Understand the need for a high level of professional and ethical conduct in engineering and a knowledge of

professional codes of conduct.

14. Apply knowledge and understanding of the commercial, economic and social context of engineering processes.

15. Apply knowledge of management techniques that may be used to achieve engineering objectives.

16. Understand the requirement for engineering activities to promote sustainable development.

17. Demonstrate an awareness of relevant legal requirements governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues.

18. Demonstrate an awareness of risk issues, including health & safety, environmental and commercial risk.

19. Understand contexts in which engineering knowledge can be applied e.g. operations and management, application and development of technology, etc.

20. Demonstrate understanding of and ability to use relevant materials, equipment, tools, processes, or products.

21. Apply knowledge and understanding of workshop and laboratory practice.

22. Use and apply information from technical literature.

23. Use appropriate codes of practice and industry standards.

24. Demonstrate an awareness of quality issues and their application to continuous improvement.

25. Demonstrate an awareness of team roles and the ability to work as a member of an engineering team.

26. Apply their skills in problem solving, communication, information retrieval, working with others and the effective use of general IT facilities.

27. Plan self-learning and improve performance, as the foundation for lifelong learning and CPD.

28. Plan and carry out a personal programme of work.

29. Exercise personal responsibility, which may also be as a member of a team.

## Alternative target awards

*A student who is eligible for the following awards will be able to:*

Bachelor of Science with Honours (SW) in Computing and Smart Devices -

Provide evidence of their enhanced knowledge, experience and capabilities acquired through an approved industrial placement opportunity in a UK, European or international organisation involved in a relevant computing and/or smart devices arena. Furthermore, they will be able to demonstrate the professional and personal skills necessary for effective employment within a professional environment.

## Teaching, Learning and Assessment

*The methods used to enable outcomes to be achieved and demonstrated are as follows:*

Acquisition of underpinning knowledge is achieved mainly through lectures, tutorials, practical laboratory-based assignments and directed student-centred learning.

Testing of the knowledge base is mainly undertaken through written assignments and practical laboratory reports.

Engineering analysis is developed through lectures, case-studies and laboratory practice. Fundamental principles are delivered predominantly by lectures and laboratory classes. More advanced techniques are delivered by project work and group-based activities.

Engineering analysis and problem solving skills are assessed through a combination of assignments and laboratory reports and project work.

Design is taught through coursework, individual and group project work supported by an appropriate lecture and tutorial programme.

Design skills are assessed through coursework, individual and group written project reports and presentation activities.

Engineering practice is an inherent part of this academic programme and permeates almost every aspect of the course.

Assessment of Engineering practice is carried out through a variety of activities, many of which are written and practical assignment based reports.

# Programme structure - programme rules and modules

Students have the option to undertake a placement year. The placement year, module 5177CSD, will follow Level 5 and students will be enrolled on a 480 credit honours sandwich programme. The Level 5 mean for the final award mark will be calculated based upon the 240 credits at Level 5. Students successfully completing the assessment of the placement year are eligible for a Sandwich award.

Students not undertaking a placement year are registered on the non-sandwich version of the programme and will have the opportunity of an additional study year abroad following Level 5. Students will be enrolled on a 480 credit honours with study abroad programme. Of those 480 credits, 120 will be taken via a Level 5 study abroad module 5178CSD. The modules to be studied in the host institution must be agreed in advance. The Level 5 mean for the final award mark will be calculated based upon the 240 credits at Level 5.

Due to the COVID-19 pandemic, to better facilitate face-to-face learning, and to allow students further time to synthesise learning, modules 4174CSD and 5173CSD will be delivered year-long across both semesters during 2020-21.

| Level 6 | Potential Awards on completion | Bachelor of Science with Honours |
|---|---|---|
| Core | Option | Award Requirements |
| 6171CSD Advanced & Embedded Sensors (20 credits)<br>6172CSD Smart Device Communications (20 credits)<br>6173CSD Big Data Analytics (20 credits)<br>6174CSD Management, Leadership & Entrepreneurship (20 credits)<br>6175CSD Final Year Project (40 credits) | | 120 core credits at level 6<br>0 option credits at level 6 |

| Level 5 | Potential Awards on completion | |
|---|---|---|
| Core | Option | Award Requirements |
| 5171CSD Mobile Devices & Wireless Technology (20 credits)<br>5172CSD Sensor Technology (20 credits)<br>5173CSD Applied Electronics And Control (20 credits)<br>5174CSD AI & Machine Learning (20 credits)<br>5175CSD Internet of Things (20 credits)<br>5176CSD Smart Device Project (20 credits) | | 120 core credits at level 5<br>0 option credits at level 5 |

| Level 4 | Potential Awards on completion | |
|---|---|---|
| Core | Option | Award Requirements |
| 4171CSD The Smart Environment (20 credits)<br>4172CSD Applied Maths: The Essentials (20 credits)<br>4173CSD Design Principles (20 credits)<br>4174CSD Introduction to Electronics and Control (20 credits)<br>4175CSD The Digital Platform & Cyberspace Technology (20 credits)<br>4176CSD Designing Software Apps (20 credits) | | 120 core credits at level 4<br>0 option credits at level 4 |

## Information about assessment regulations

All programmes leading to LJMU awards operate within the University's Academic Framework.
https://www.ljmu.ac.uk/about-us/public-information/academic-quality-and-regulations/academic-framework

## Opportunities for work-related learning ( location and nature of activities)

Students are encouraged and supported to find and undertake a year's industrial placement between Level 5 and 6. There is also further opportunity to undertake summer placements between academic years to gain valuable industrial experience. The work experience will help develop understanding of the work environment suitable for the programme and increase a student's professional practice.

## Criteria for admission

**A/AS Level**
Applicants should have or expect to obtain a total of 112 UCAS points. At A2-level, applicants should expect to obtain at least two awards and gain at least 80 points from mathematics, computing, IT, physics or other technical subjects.

**BTEC National Diploma**
Applicants should obtain BTEC (QCF) Diploma or Extended Diploma grades DMM, UCAS 112 points equivalent in computing, IT, Electronics or similar related subjects.

**Other**
Applicants should have five GCSE (or equivalent) passes of at least grade C including Mathematics and English (or IELTS 6.0).

Applicants offering other awards (e.g. Welsh Baccalaureate, European Baccalaureate, pre-2002 BTEC National Certificate/Diploma, Advanced Extension Awards, pre-curriculum 2000 A-levels etc.) or combinations of unit awards may also be accepted.

**Mature entry**
We welcome applications from highly motivated mature students with relevant experience but without the necessary formal qualifications. All applications will be considered on an individual basis.

## External Quality Benchmarks

All programmes leading to LJMU awards have been designed and approved in accordance with the UK Quality Code for Higher Education, including the Framework for Higher Education Qualifications in the UK (FHEQ) and subject benchmark statements where applicable.

The University is subject to periodic review of its quality and standards by the Quality Assurance Agency (QAA) Published review reports are available on the QAA website at www.qaa.ac.uk

Programmes which are professionally accredited are reviewed by professional, statutory and regulatory bodies (PSRBs) and such programmes must meet the competencies/standards of those PSRBs.

## Support for students and their learning

The University aims to provide students with access to appropriate and timely information, support and guidance to ensure that they are able to benefit fully from their time at LJMU. All students are assigned a Personal Tutor to provide academic support and when necessary signpost students to the appropriate University support services.

Students are able to access a range of professional services including:

- Advice on practical aspects of study and how to use these opportunities to support and enhance their personal and academic development. This includes support for placements and careers guidance.
- Student Advice and Wellbeing Services provide students with advice, support and information, particularly in the areas of: student funding and financial matters, disability, advice and support to international students, study support, accommodation, health, wellbeing and counselling.
- Students studying for an LJMU award at a partner organisation will have access to local support services

## Methods for evaluating and improving the quality and standards of teaching and learning

**Student Feedback and Evaluation**

The University uses the results of student feedback from internal and external student surveys (such as module evaluations, the NSS and PTES), module evaluation questionnaires and meetings with student representatives to improve the quality of programmes.

**Staff development**

The quality of teaching is assured through staff review and staff development in learning, teaching and assessment.

**Internal Review**

All programmes are reviewed annually and periodically, informed by a range of data and feedback, to ensure quality and standards of programmes and to make improvements to programmes.

**External Examining**

External examiners are appointed to programmes to assess whether:

- the University is maintaining the threshold academic standards set for awards in accordance with the FHEQ and applicable subject benchmark statements
- the assessment process measures student achievement rigorously and fairly against the intended outcomes of the programme(s) and is conducted in line with University policies and regulations
- the academic standards are comparable with those in other UK higher education institutions of which external examiners have experience
- the achievement of students are comparable with those in other UK higher education institutions of which the external examiners have experience

and to provide informative comment and recommendations on:

- good practice and innovation relating to learning, teaching and assessment observed by external examiners
- opportunities to enhance the quality of the learning opportunities provided to students

***Please note:***

*This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. More detailed information on the learning outcomes, content, teaching, learning and assessment methods of each module can be found in module and programme guides.*