Please note: This specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if s/he takes full advantage of the learning opportunities that are provided.

We regularly review our course content, to make it relevant and current for the benefit of our students. For these reasons, course modules may be updated.

More detailed information on the learning outcomes, content, and teaching, learning and assessment methods of each module can be found in the Module Information Directory (MID), student module guide(s) and the course handbook.

The accuracy of the information contained in this document is reviewed by the University and may be verified by the Quality Assurance Agency for Higher Education.
BEng Computer Hardware and Software Engineering

1. Introduction

This course is designed to bridge the gap between electronics/hardware engineering and computer science/software engineering, provide a BEng Honours and BEng degree education in the hardware and software aspects of engineering. The course provides students with the knowledge and skills necessary to take up the challenges for development of future technologies such as IoT, smart cities, green technologies etc. Graduates of the course would be able to solve the problems related to both electronics and software by learning the subjects related Electronic Engineering, Mathematics, Embedded Systems, Computer Architecture and Security, Programming, Digital System Design etc. Moreover, the course is designed to produce graduates with the transferable skills needed in a wide range of careers in industries.

Coventry University has a long tradition of teaching computing and electronics with a strong emphasis on its applications in practical situations. All students receive the opportunity of developing an international flavour to their studies, either through the participation in a field trip, or a year studying abroad. The Faculty of Engineering, Environment and Computing (EEC) has an award winning placement and employability service, EEC Futures, which helps students find placements between their second and third year if they so desire.

The School of Computing, Electronics and Mathematics (CEM) in the EEC faculty offers innovative degree courses in the study and practice of computing, electrical and electronic engineering and maths. The school actively collaborates with many commercial partners and organise a full calendar of events to enable students to interact with potential employers. The school is committed to providing its students with the highest standards in teaching and pride itself on its motivating, supportive, safe and inclusive learning environment. The CEM courses provide students with the opportunity to become highly qualified professionals who can think creatively and independently, ready to meet the challenges of the rapidly changing technological environment.

The course has two key themes on computer hardware and software engineering, to meet the demand of industries to produce engineers with more versatile skill set. Under the computer hardware theme, students will learn the basics of computer, analogue and digital electronics, circuit analysis theory and embedded system in the first year of study. In second year, more advanced electronics and embedded system design topics will be covered which will lead to advanced system design such as FPGA based design and System on Chip design in final year of study. Similarly, in the software theme, students will learn basics of programming and algorithms in the first year. In second year, students will be taught object oriented programming and operating system, which will lead to Mobile app development and Machine Learning module in final year of study. In addition, the course will offer modules related to networking and security, which will enable students to take up challenges of modern day security. Other modules such as Engineering Mathematics 1, Professional Skills for Engineers and Individual project will supplement the above-mentioned key themes.

In addition to the key theme covered, the course also offers student the opportunity of Activity Led Learning (ALL) both in first year and second year of study. More innovative learning approaches such as flipped learning and research informed learning are also blended in the course to provide students an excellent learning experience throughout the study. Moreover, students can participate in international field trips to enhance their global experience. Similarly, they can opt out their study for a placement year or study year abroad after finishing the second year of study.
<table>
<thead>
<tr>
<th>Available Award(s) and Modes of Study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Title of Award</strong></td>
</tr>
<tr>
<td>BEng Honours Computer Hardware and Software Engineering</td>
</tr>
<tr>
<td><strong>Fall-back:</strong> BEng Computer Hardware and Software Engineering</td>
</tr>
<tr>
<td>DipHE</td>
</tr>
<tr>
<td>CertHE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Awarding Institution/ Body</th>
<th>Coventry University</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Collaboration</th>
<th>N/A</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Teaching Institution and Location of delivery</th>
<th>Coventry University</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Internal Approval/ Review Dates</th>
<th>Date of latest review: February 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Date for next review: Academic year 2026/27</td>
</tr>
</tbody>
</table>

| Course Accredited by | The BEng Honours Computer Hardware and Software Engineering degree is accredited by the Institution of Engineering and Technology (IET) as satisfying the requirements for IEng registration. |

<table>
<thead>
<tr>
<th>Accreditation Date and Duration</th>
<th>March 2019 for five years.</th>
</tr>
</thead>
</table>


<table>
<thead>
<tr>
<th>Date of Course Specification</th>
<th>February 2019</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Course Director</th>
<th>Dr Zahir Ahmad</th>
</tr>
</thead>
</table>
12 Outline and Educational Aims of the Course

The main educational aim of the BEng Computer Hardware and Software Engineering course is to produce graduates with the knowledge, skills and understanding needed to make a significant contribution to the computer and electronics industry as a professional incorporated engineer. More specific aims of the course are:

- To acquire fundamental knowledge and understanding of the subject.
- To develop the practical skills expected of a professional engineering in the related field.
- To develop the intellectual and independent thinking necessary to participate in contemporary engineering projects and to peruse further studies and research.
- To provide the general transferable skills and personal attitudes and determination necessary to enable the student to make a valuable contribution throughout a successful career in the computer industry or industries employing computer hardware and software technology.
- To provide a general education consistent with Honours level of the QAA’s Framework for Higher Education Qualifications and the incorporated engineer general and specific learning outcome statements of the Engineering Council’s UK-SPEC 2014 and the Accreditation of Higher Education Programmes (AHEP 2014).
- To provide industry and commerce with the graduates they need.
- To further, the University mission by providing an excellent education enriched by practical work.

13 Course Learning Outcomes

A student who successfully completes the course will have achieved the following Course Learning Outcomes.

**B1. Science and mathematics**
Knowledge of mathematics and scientific principles for evolution of relevant technologies and ability to apply the knowledge in the relevant engineering discipline to support application of key engineering principles.

**B2. Engineering analysis**
Understanding of engineering principles to analyse a process, ability to use of analytical method and apply quantitative and computational methods to solve engineering problems.

**B3. Design**
Investigate a problem by gathering information from different sources and apply technical knowledge and skills to find a rigorous and creative solution to the problem by planning, designing and evaluating the outcome.

**B4. Programming**
Develop solutions for the emerging technologies by creating a program for both hardware and software using an appropriate programming language.

**B5. Computer Architecture and security**
Knowledge of modern computer architecture including different networking technologies, operating systems and internet-based infrastructure, with a focus on maintaining their security.

**B6. Software development**
Understanding initial requirements analyse and develop the software including final testing.

**B7. Engineering practice**
Understanding of the use of technical literature and industry standards, knowledge of characteristics of different products and equipment, and ability to apply relevant practical and laboratory skills.

**B8. Additional general skills/Transferable skills**
Apply different types of transferable skills such as communication skills, management skills, team working, and critical reflection on own and others work.

**B9. Economic, legal, social, ethical and environmental context**
Understanding the professional and ethical conduct in engineering, knowledge of commercial, economic and social context of engineering processes, and awareness of relevant legal requirements governing engineering activities.
14 Course Structure and Requirements, Levels, Modules, Credits and Awards

14.1 Add+Vantage Scheme

As required by University regulations, students will take one 10 credit Add+Vantage module at each of Levels 4 - 6 of their course. The Add+Vantage scheme is a University initiative for broadening students’ studies. There is a large collection of 10 credit modules in a wide variety of areas, many linked to ‘graduateness’ and ‘employability’. The scheme includes languages, law, advanced IT and mathematical skills.

14.2 Progression through course

To progress from one stage to the next, students must normally pass all modules. Students who fail to pass sufficient modules to progress will be considered under the Academic Regulations.

- To progress from Level 4 to Level 5 students must obtain at least 110 of the 120 available credits: pass all but the Add+Vantage module.
- To progress from Level 5 to professional training (5012CEM), students will be required to have gained 110 credits at Level 5: pass all but the Add+Vantage module.
  - To progress from Level 5 to Level 6 students must obtain at least 110 of the 120 available credits: pass all but the Add+Vantage module.

14.3 Professional Training or Study Abroad and the award of Sandwich degrees (Optional)

Students may undertake a year out in industry or a year studying abroad between levels 5 and 6 of their course. Students will be enrolled onto relevant modules, which they must take and pass to achieve a Sandwich degree (5013CEM) or a Full Time with Study Abroad degree (5013CEM).

5012CEM or 5013CEM are non-credit bearing modules, pass/fail only. They cannot replace any course credits in the final award or be included in the overall award classification.

14.4 Cascade of awards

BEng (Hons) in Computer Hardware and Software Engineering
↓
BEng in Computer Hardware and Software Engineering
↓
Diploma of Higher Education
↓
Certificate of Higher Education

To achieve the award of Honours or Unclassified degree from study on the course a student must achieve the minimum credits specified in the University academic regulations.

The requirement for a BEng Honours award is as follows:
1. Achievement of 360 CATS credits at Levels 4, 5 and 6.
2. A pass in all of the mandatory modules in the recommended course of study for the named award. The project module must be included in the calculation of the class of award for all Honours Degree awards.

14.5 Conditions for fall back award

The requirement for a BEng unclassified award is as follows:
1. Achievement of 300 CATS credits at Levels 4, 5 and 6.
2. A pass in all of the mandatory modules, except the project.
The requirement for a DipHE award is as follows:
   1. Achievement of 240 CATS credits at Levels 4 or 5 made up from modules specified as part of the course.

The requirement for a CertHE award is as follows:
   1. Achievement of 120 CATS credits at Levels 4 or 5 made up from modules specified as part of the course.
Modules within the course, their status (whether mandatory or options), the levels at which they are studied, and their credit value are identified in the table below.

<table>
<thead>
<tr>
<th>Credit level</th>
<th>Semester</th>
<th>Module Code</th>
<th>Title</th>
<th>Credit Value</th>
<th>Mandatory/ Optional</th>
<th>Course Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 4</td>
<td>Semester 1</td>
<td>4037CEM</td>
<td>Analogue Circuits and Embedded Systems</td>
<td>20</td>
<td>M</td>
<td>B2, B3, B4, B7, B8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4038CEM</td>
<td>Engineering Mathematics 1</td>
<td>20</td>
<td>M</td>
<td>B1, B2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4043CEM</td>
<td>Introduction to Programming and Algorithms</td>
<td>20</td>
<td>M</td>
<td>B3, B4, B6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4044CEM</td>
<td>Professional Skills for Engineers</td>
<td>0</td>
<td>M</td>
<td>B8, B9</td>
</tr>
<tr>
<td></td>
<td>Semester 2</td>
<td>4014CEM</td>
<td>Electrical Science</td>
<td>10</td>
<td>M</td>
<td>B1, B2, B3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4023CEM</td>
<td>Introduction to Computer Engineering</td>
<td>20</td>
<td>M</td>
<td>B3, B4, B5, B6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4040CEM</td>
<td>Analogue and Digital Electronics 1</td>
<td>20</td>
<td>M</td>
<td>B1, B2, B3, B8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Add+Vantage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 5</td>
<td>Semester 1</td>
<td>5045CEM</td>
<td>Analogue and Digital Electronics 2</td>
<td>20</td>
<td>M</td>
<td>B1, B2, B3, B7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5051CEM</td>
<td>Object Oriented Programming</td>
<td>20</td>
<td>M</td>
<td>B3, B4, B6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5054CEM</td>
<td>Communication and Networking Systems</td>
<td>20</td>
<td>M</td>
<td>B1, B5, B7, B8, B9</td>
</tr>
<tr>
<td></td>
<td>Semester 2</td>
<td>5004CEM</td>
<td>Operating Systems and security</td>
<td>20</td>
<td>M</td>
<td>B5, B9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5037CEM</td>
<td>Manufacture of Electronic Systems for Regulatory Compliance</td>
<td>10</td>
<td>M</td>
<td>B3, B7, B9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5048CEM</td>
<td>Embedded System Design &amp; Development</td>
<td>20</td>
<td>M</td>
<td>B2, B3, B4, B7, B8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Add+Vantage</td>
<td></td>
<td>10</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>Level 5:</td>
<td>Optional Placement training/International experience year</td>
<td>5012CEM</td>
<td>Professional training year</td>
<td>0</td>
<td>O</td>
<td>B2, B3, B4, B6, B7, B8, B9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5013CEM</td>
<td>International Experience Year</td>
<td>0</td>
<td>O</td>
<td>B2, B3, B4, B6, B7, B8, B9</td>
</tr>
<tr>
<td>Level 6</td>
<td>Semester 1</td>
<td>6002CEM</td>
<td>Mobile Application Development</td>
<td>20</td>
<td>M</td>
<td>B3, B4, B6, B9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6037CEM</td>
<td>Hardware Realisation of a Computer System</td>
<td>20</td>
<td>M</td>
<td>B3, B4, B5, B7, B9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6039CEM</td>
<td>Individual Project Preparation</td>
<td>10</td>
<td>M</td>
<td>B3, B7, B8, B9</td>
</tr>
<tr>
<td></td>
<td>Semester 2</td>
<td>6005CEM</td>
<td>Security</td>
<td>20</td>
<td>O</td>
<td>B4, B5, B6, B8, B9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6006CEM</td>
<td>Machine Learning and Related Applications</td>
<td>20</td>
<td>O</td>
<td>B4, B8, B9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6040CEM</td>
<td>Individual Project Realisation</td>
<td>20</td>
<td>M</td>
<td>B2, B4, B6, B7, B8, B9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6045CEM</td>
<td>System on Chip Design</td>
<td>20</td>
<td>M</td>
<td>B3, B4, B5, B7, B9</td>
</tr>
</tbody>
</table>
15 Criteria for Admission and Selection Procedure

UCAS entry profiles may be found at http://www.ucas.ac.uk/students/choosingcourses/entryrequirements

For details of acceptable equivalent qualifications for this course, please visit: http://www.coventry.ac.uk/study-at-coventry/apply-now/entry-requirements-uk-eu-students/

Applications involving other UK or overseas qualifications, mature candidates, or for direct entry to later stages of the course from candidates with experience are welcome and will be considered on their merit.

16 Academic Regulations and Regulations of Assessment

This Course conforms to the standard University Academic Regulations Undergraduate Mode E.
17 Indicators of Quality Enhancement

The Course is managed by the Computing, Electronics and Mathematics (CEM) School Board of Study of the Faculty of Engineering, Environment & Computing.

The Programme Assessment Board (PAB) for Engineering, Environment & Computing is responsible for considering the progress of all students and making awards in accordance with both the University and course-specific regulations.

The assurance of the quality of modules is the responsibility of the Boards of Study which contribute modules to the course.

External Examiners have the opportunity to moderate all assessment tasks and a sample of assessed work for each module. They will report annually on the course and/or constituent modules and their views are considered as part of the Course Quality Enhancement Monitoring (CQEM). Details of the CQEM process can be found on the Registry’s web site.

Students are represented on the Student Forum, Board of Study and Faculty Board, all of which normally meet two or three times per year.

Student views are also sought through module and course evaluation questionnaires.

- The course has been designed in accordance with the relevant QAA Engineering subject benchmark statements for the subject and professional body requirements (see Section 9).
- Accreditation is to be sought from the Institutions of Engineering and Technology (IET) to ensure the course meets professional standards.
- The course has excellent links with local employers. Regular meetings of the Industry Advisory Board, made up of specialized employers, provide input to course management and development. Student projects are often informed by working with industrial and research partners.
- The faculty has a number of research centres and has a strong portfolio of research interests in wireless sensors, Internet of Things (IoT), computer networks and communications, pervasive Computing, distributed computer systems, digital forensics, computer security, serious games, virtual reality, aerodynamics and electrical energy.
- The last research assessment exercise by the 2014 Research Excellence Framework (REF2014) resulted in the following overall ratings for relevant subjects: Computer Science & Informatics (5% World-leading, 37% Internationally Excellent, 55% International), of particular note is that 100% of the impact were ranked Internationally Excellent or better; General Engineering (4% World-leading, 56% Internationally Excellent, 38% International), of particular note is that 80% of the environment were ranked Internationally Excellent.

QAA

The report of QAA’s Institutional Audit undertaken in 2015 confirmed that

1. The maintenance of the threshold academic standards of awards offered on behalf of degree-awarding bodies and/or other awarding organisations meets UK expectations.
2. The quality of student learning opportunities at the provider meets UK expectations
3. The quality of the information produced by the provider about its provision meets UK expectations.
4. The enhancement of student learning opportunities at the provider meets UK expectations.
18 Additional Information

Enrolled students have access to additional, key sources of information about the course and student support including,

Faculty Student handbook
Course Handbook
Module Guides
Module Information Directory
Student Portal

Induction

Students engage in a series of induction events, ‘Student Essentials’ over the first six weeks of their course. The Student Essentials encompass a number of academic, administrative and social events including a welcome and introduction to the university, the facilities and the faculty. As part of the Student Essentials induction events, all students are directed to an online student handbook and a course handbook which provides key information.

Buildings and Equipment

The faculty is mainly based within three buildings, the Engineering and Computing building, the Sir John Laing building and the George Eliot building, all of which are equipped with specialist equipment to support students. This includes a high performance engineering centre which houses a full size harrier, three further simulators, a wind and smoke tunnel, civil engineering specialist testing equipment, a range of CNC machinery, a laser workshop and a 3D Geoscience Information Laboratory.

Student Support

Students will be allocated an Academic Personal Tutor who will provide on-going academic support throughout the year. Students are expected to attend regular meetings with their tutor within a timetabled group meeting. Support is also available via Course Directors, who are available to advise students on academic and pastoral issues. Times that Course Directors are available to meet with students will be shown on course Moodle webs and also their location. Module Leaders and the associated module team are available to offer support at module level. Again Module Leaders advertise their contact times on module Moodle webs and also their location. Outside of office hours, you can also email any member of academic staff.

The Faculty Registry team support you through your studies, providing information and guidance on the rules and procedures that affect your academic progress. Faculty Registry can help you deal with problems you may be having with academic life and help you understand the University’s academic processes and regulations. They have a detailed understanding of the curriculum structures and other specialist support that is available to you within the University.

The Faculty Registry have offices located close to the main Student Information Points/Receptions. Students can drop by the Registry support desk which is next to reception in the ECB; Monday – Friday from 1000 – 1600. Or Students can contact Registry staff via the Reception desks in the EC building or the John Laing building; Monday – Friday from 0830 – 1700. This team can also be emailed FacultyRegistry.eec@coventry.ac.uk at any time and this will be passed to each student’s dedicated course support team to respond to.

The Faculty Learning Support Co-ordinators and Learning Support Tutors work closely with the Disabilities Office in the Hub and Course Teams within the Faculty. Reasonable adjustments will be made for students with disabilities who have registered with the University as requiring additional support with their studies.

The University has an excellent record on widening access and welcomes students from all backgrounds and neighbourhoods with low participation in higher education.

Students have access to a Maths Support Centre called SIGMA based in the Library. The Centre for Academic Writing (CAW) can also provide support on topics ranging from how to organise an academic argument to improving grammar and sentence structure. The university provides support for students’ health and wellbeing which includes a Medical Centre, Spirituality and Faith Centre, Counselling and Mental Health Service, Sports and Recreational Centre and a Nursery.
The Student’s Union also provide recreational facilities, support, and advice for students. International Students may obtain further help from the student welfare team in the International Student Centre.

There is a careers service where qualified consultants are available to help students think about the issues they face as they move through University studies and prepare for employment.

Students may seek to undertake a relevant professional/international placement year between levels 5 and 6 of an undergraduate degree, this opportunity is encouraged to provide students with the depth of experience that such an opportunity affords. Assistance with acquiring a relevant placement is offered by the Faculty’s Placement Team – EEC Futures. Within each School there is also an Industrial Placement Tutor who will be identified to you during your course.

Library – There is also additional support for all students learning within the Lanchester Library. The library hosts both physical books, administers central access to electronic resources (e-books and electronic journals) as well as document supply (obtaining books or journal articles from other universities).