Programme Specification

MSc Embedded Microelectronics and Wireless Systems
ECT069

From Academic Year: 2017/18

Faculty of Engineering, Environment and Computing
September 2017

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.
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**Introduction**

**MSc in Embedded Microelectronics and Wireless Systems**

**Rationale and Market Focus**

The course is intended for graduates with electronics or computing background; this is not a conversion course. This course is designed for anyone who is interested in how to programme devices like for example iPads or Android devices and creating their own operating systems. Other aspects include programming microcontrollers or field programmable gate arrays (FPGAs) to collect data from their environments and transfer this data from people-to-people or people-to-computers. Basically it is for anyone who is interested in the Internet of Things (IoT).

As a student on this course you will learn a combination of electronics (joint with our students from the MSc in Electrical and Electronic Engineering) including VHDL, Microprocessor Applications and Robotics. You will also study subject specific knowledge in embedded systems including object orientated programming, embedded operating systems and wireless intelligent systems. You’ll then study an individual project with the supervision of staff from the electronics and computing areas to provide a wider range of projects ranging from blue sky research based to industrial linkage projects.

The course aims to further develop students’ knowledge of and expertise in technologies associated with embedded microprocessor applications with particular prominence given to real-time applications including mobile communications and wireless sensing. An emphasis on practical work will strengthen the software development experience of students from a mainly electronics hardware background. Such work will also broaden the hands-on experience of students with a mainly software background.

Students can progress onto further study in the forms of a PhD or can onto a career in the communications industry, digital system design, etc.
1 Available Award(s) and Modes of Study

<table>
<thead>
<tr>
<th>Title of Award</th>
<th>Mode of attendance</th>
<th>UCAS Code</th>
<th>FHEQ Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSc/PGD/PGC Embedded Microelectronics and Wireless Systems</td>
<td>FT 1 year PT 3 years</td>
<td>N/A</td>
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</table>

2 Awarding Institution/Body

Coventry University

3 Collaboration

None

4 Teaching Institution and Location of delivery

Coventry University

5 Internal Approval/Review Dates

Date of latest review: March 2017
Date for next review: 2017/2018

6 Programme Accredited by

N/A

7 Accreditation Date and Duration

N/A

8 QAA Subject Benchmark Statement(s) and/or other external factors

♦ The guiding principles for this programme of study are derived from the QAA subject benchmark statements for Masters awards in Engineering.
♦ Subject Benchmark statements can be found at http://www.qaa.ac.uk/en/Publications/Documents/SBS-engineering-15.pdf
♦ The programme is also designed to comply with the National Qualifications Framework requirements for level 7 (FHEQ Level).

9 Date of Programme Specification

March 2017

10 Course Director/Course Tutor

Dr. Andrew Jason Tickle

11 Educational Aims of the Programme

The programme aims to:

- provide a relevant and useful programme, that can meet the needs of the individual, containing both theoretical and practical subjects within the broad areas of embedded microprocessor applications and real-time applications including mobile communications and wireless sensing;
- further the students' skills and knowledge acquired through relevant previous study and experience, to enhance their transferable and professional skills and thereby improve their wider employment prospects;
- enable students to further develop their analytical, critical communication and presentation skills in the context of their taught modules;
- familiarise students with contemporary applied and theoretical aspects of the programmes’ subject areas to enable them to operate as effective professionals in these areas;
- provide relevant and topical subject content for personal professional development that promotes good practice in the workplace, relating to subjects within the broad domains of programmes’ subject areas;
- provide an education consistent with Masters level of the QAA’s Framework for Higher Education Qualifications and to further the University mission statement by providing an excellent education.
12 Intended Learning Outcomes

This programme is compatible with the QAA’s Engineering benchmark statements and Coventry University’s Code of Practice for Academic and Professional Skills Development.

Section 21 maps the learning outcomes described below to the programme’s mandatory and option modules (these are identified in section 20).

The principal teaching, learning and assessment methods normally used on the programme to achieve these learning outcomes are identified in the next section.

12.1 Knowledge and Understanding

On successful completion of the programme a student should be able to demonstrate knowledge and understanding of:

KU1 Advanced principles of electrical and electronic engineering and their relationships to leading-edge, real-world applications

KU2 Advanced analysis and design tools and processes relevant to the programme’s subject areas

KU3 The implementation and critical evaluation of design solutions relevant to the subject areas through simulation and practical applications

KU4 Critically appraise the main approaches to research design, sampling and analysis appropriate to Engineering and construct research questions or hypotheses.

The principal teaching, learning and assessment methods normally used to enable outcomes to be achieved and demonstrated are identified below.

<table>
<thead>
<tr>
<th>Teaching and Learning</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>KU1 Lectures</td>
<td>Examinations</td>
</tr>
<tr>
<td>Seminar discussions</td>
<td></td>
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<tr>
<td>Independent learning</td>
<td></td>
</tr>
<tr>
<td>KU2 Tutorials</td>
<td>Coursework assignments</td>
</tr>
<tr>
<td>Seminar discussions</td>
<td>In-class tests</td>
</tr>
<tr>
<td>KU3 Tutorials</td>
<td>Coursework assignments</td>
</tr>
<tr>
<td>Independent learning</td>
<td>Student presentations</td>
</tr>
<tr>
<td>KU4 Tutorials</td>
<td>Coursework assignments</td>
</tr>
<tr>
<td>Independent learning</td>
<td>Student presentations</td>
</tr>
</tbody>
</table>

12.2 Cognitive (thinking) Skills

On successful completion of the programme a student should be able to:

CS1 Conceptualise complex technical aspects of electrical and electronic engineering

CS2 Conduct detailed and systematic technical analyses of aspects of electrical and electronic engineering

CS3 Devise technical solutions to problems in the design and implementation of electrical and electronic engineering

CS4 Critically evaluate literature and solutions relating to problems arising in the design and implementation aspects of electrical and electronic engineering

The principal teaching, learning and assessment methods normally used to enable outcomes to be achieved and demonstrated are identified below.

<table>
<thead>
<tr>
<th>Teaching and Learning</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS1 Activity-led learning</td>
<td>Demonstrations</td>
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<tr>
<td></td>
<td>Presentations</td>
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<tr>
<td>--------</td>
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</tr>
<tr>
<td>CS2</td>
<td>Activity-led learning</td>
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<tr>
<td></td>
<td>Problem solving exercises</td>
</tr>
<tr>
<td>CS3</td>
<td>Project work</td>
</tr>
<tr>
<td></td>
<td>Problem solving exercises</td>
</tr>
<tr>
<td>CS4</td>
<td>Project work</td>
</tr>
<tr>
<td></td>
<td>Problem solving exercises</td>
</tr>
</tbody>
</table>

12.3 Practical Skills

On successful completion of the programme a student should be able to:

PS1 Select, apply and critically appraise tools and techniques of advanced analysis and design appropriate to the subject area

PS2 Implement appropriate software and hardware solutions and simulations and critically evaluate the outcomes

PS3 Plan, perform, critically evaluate and present the results of an independent project in a chosen specialist subject area

The principal teaching, learning and assessment methods normally used to enable outcomes to be achieved and demonstrated are identified below.

<table>
<thead>
<tr>
<th>Teaching and Learning</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS1 Activity-led learning Laboratories</td>
<td>Demonstrations Presentations</td>
</tr>
<tr>
<td>PS2 Laboratories Problem-solving exercises</td>
<td>Demonstrations Reports</td>
</tr>
<tr>
<td>PS3 Project work Laboratories</td>
<td>Viva-voce examinations Reports</td>
</tr>
</tbody>
</table>

12.4 Transferable Skills

On successful completion of the programme a student should be able to:

TS1 Effectively apply analytical, critical and communication skills

TS2 Produce written reports and deliver oral presentations

TS3 Engage in self-directed study and continuous professional development (CPD)

TS4 Operate as part of a team

TS5 Critically evaluate the key ethical, political, legal and social issues that need to be considered when carrying out research

TS6 Present a portfolio of subject specific and generic skills appropriate to obtaining graduate level employment or engaging in self-directed study of modules.

Transferable/key skills are generally incorporated within modules and related to relevant assessments as appropriate. Self-directed study of modules.

The wide range of assessment techniques will ensure that students are given every opportunity to demonstrate their skills in a variety of contexts.

13 Programme Structure and Requirements, Levels, Modules, Credits and Awards

1. Background:

Modules within the programme, their status the levels at which they are studied, their credit value and pre/co requisites are included in the course entry requirements. The programme has been designed to operate over one year of full-time study. The taught modules are delivered over two s
The programme requires that students enrol for eight 15 CATS credits mandatory modules, and a 60 CATS credit project. This is summarised in the graphic on the next page.

13.1 Cascade of Awards:
All Engineering, Environment and Computing Faculty masters programmes have been constructed to comply with the University Academic Regulations. Computing Faculty masters programmes are all specified at M-level and are based either on module sizes of 1.5 units (15 CATS)

<table>
<thead>
<tr>
<th>Programme</th>
<th>Credits</th>
<th>Award Requirements</th>
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</thead>
<tbody>
<tr>
<td>MSc Embedded Microelectronics and Wireless Systems</td>
<td>180 CATS</td>
<td>Pass eight mandatory modules, and a 60 credit project as detailed in Section 20</td>
</tr>
<tr>
<td>PGD Embedded Microelectronics and Wireless Systems</td>
<td>120 CATS</td>
<td>Pass eight mandatory modules as detailed in Section 20</td>
</tr>
<tr>
<td>PGC Embedded Microelectronics and Wireless Systems</td>
<td>60 CATS</td>
<td>Pass at least 4 taught modules from the list detailed in section 20</td>
</tr>
</tbody>
</table>

The classification requirements for Merit and Distinction are as detailed in the University Academic Regulations.
Part-time students are expected to create a study plan by attending modules with the full-time students.

14 Support for Students and their Learning

Induction
Students attend an induction program in the week preceding the beginning of their enrolment period. The induction timetable includes a number of academic, administrative and social events that include a welcome and introduction to the university, the facilities and the faculty. As part of the induction process, 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 two buildings ECB and Sir John Laing building, both of which are equipped with specialist equipment to support all students. This includes a high performance engineering centre which houses computing facilities, a full size harrier, three further simulators, a wind and smoke tunnel, civil engineering specialist testing equipment, a range of CNC machinery and a laser workshop.

**Student Support**
A comprehensive support and guidance system exists for all postgraduate students within the faculty of Engineering and Computing. Support is 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.

Prior to the commencement of the Masters project, individual supervisors with appropriate expertise or research experience are assigned to each student. The Faculty Registry team support you through your studies, providing information and guidance on the rules and procedures that affect your academic progress. We can help you deal with problems you may be having with academic life and help you understand the University’s academic processes and regulations. We 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 Receptions. You can drop by the Registry support desk which is next to reception in the ECB; Monday – Friday from 1000 – 1600. Or you can contact Registry staff via the Reception desks in the main EC building or the John Laing building; Monday – Friday from 0830 – 1700. This team can also be emailed CEM.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-ordinator works closely with Disabilities Office and Departmental Course Teams. Reasonable adjustments will be made for students with disabilities who have registered with the University as requiring additions 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 Services, Sports and Recreational Centre and a Nursery.

The Students’ Union also provides recreational facilities and support and advice for students. International Students may obtain further help from the student welfare team in the International Office.

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.

All postgraduate students are also eligible to enrol and be a part of the Global Leaders Program (GLP). This is an initiative focussed on better preparing Coventry University’s postgraduate students to become the leaders of tomorrow in their chosen fields and to further develop a global mind set.

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**15 Criteria for Admission**
The normal entry requirements are that applicants should possess:

- Minimum of a second class honours degree in relevant subjects. This is not a Conversion Course.
- Relevant professional qualification of an equivalent level
- Lower qualification plus appropriate and relevant experience at a professional level
• Satisfactory independent evidence of working for several years in a position commensurate with that of an honours degree graduate in a relevant field.

Students whose first language is not English must demonstrate proficiency in the English language equivalent to IELTS 6.5. Alternatively students may be admitted with IELTS 6.0 if they attend a compulsory five week pre-sessional English course, operated by Coventry University, before joining their master’s programme.

• Applications from those not possessing the equivalent of an honours degree will be considered on individual merit with decisions made based on careful evaluation of the capacity of the applicant to complete the programme successfully.
• If it is deemed appropriate, applicants may be offered an opportunity to undertake a preliminary programme of study prior to enrolling on the programme.
• Accreditation for prior learning (APL) is in accordance with University regulations. The accreditation for Prior Experiential learning (APEL) will only be awarded for achievements equivalent to masters’ level.
• Module exemptions can be given for prerequisites that have been achieved through previous study or experience. However appropriate alternative modules may be substituted, subject to the approval of the Course Director, who must ensure that the aims and learning outcomes of the named award are achieved by any variations in programmes of study.

16 Method for Evaluating and Enhancing the Quality and Standards of Teaching and Learning

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

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

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

External Examiners report annually on the programme and their views are considered as part of the Course Quality Enhancement Monitoring report (CQEM). Details of the CQEM process can be found on the Registry’s web site.

Students are represented on the Student Forum, Boards 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.

17 Regulation of Assessment

• University policy requires the internal moderation of all assessments.

• External Examiners are appointed for all named University awards. The role of the External Examiner at module level is to ensure that academic standards are in line with national norms for the subject. External Examiners undertake the moderation of examination papers and assessment tasks, and view representative samples of work for the modules for which they have responsibility. At programme level, External Examiners help to ensure fairness in the consideration of student progression and awards. They have the right to comment on all aspects of the assessment system and participate as full members of the assessment boards.

• The pass mark for all modules is 40%. This overall module mark may comprise more than one component (e.g. coursework and exam). The individual module descriptors give the precise pass criteria and the weighting of the component marks that contribute to the overall module mark.

• Awards for Taught Master programmes may be made with Distinction, Merit or Pass (i.e. achievement of an average mark of at least 70%, 60% or 40% respectively).
18 Indicators of Quality and Standards

The following are key indicators of quality and standards:

- The programme has been designed in accordance with the QAA benchmark statements for Master’s degrees and the University’s quality procedures were confirmed by a QAA Institutional Audit. A positive set of REF 2014 results. 61% of our research was rated as 4* or 3* in REF 2014. This is a significant increase. 92% of our research was rated as 4*, 3* or 2* in REF 2014.
- In all areas of the Faculty there is a strong and regular industry input to the subject-base. This is achieved through long-standing advisory boards, industry-focused collaborative research initiatives and use of guest speakers from industry.
- The Industry Advisory Board has members from local industry, educational bodies and commerce.
- When possible students are encouraged and supported in taking on and completing industry-informed projects (where appropriate) for their Masters’ study.

19 Additional Information

Key sources of information about the course and student support can be found in:

- Student Handbook
- Course Handbook
- Module Guides
- Moodle Course & Module Webs
- Module Information Directory
- EC Student Portal [https://students.coventry.ac.uk/EC/Pages/Home.aspx](https://students.coventry.ac.uk/EC/Pages/Home.aspx)
- Coventry University Student Portal [https://students.coventry.ac.uk/Pages/index.aspx](https://students.coventry.ac.uk/Pages/index.aspx)

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<table>
<thead>
<tr>
<th>Module code</th>
<th>Module title</th>
<th>Credit value</th>
<th>Status</th>
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<tbody>
<tr>
<td>M01CDE</td>
<td>Embedded Systems Programming</td>
<td>15</td>
<td>M</td>
</tr>
<tr>
<td>M01AEE</td>
<td>VHDL for Digital System Design</td>
<td>15</td>
<td>M</td>
</tr>
<tr>
<td>M02CDE</td>
<td>Digital Communication Systems</td>
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<td>O</td>
</tr>
<tr>
<td>M03CDE</td>
<td>Digital Signal and Image Processing</td>
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<tr>
<td>M04CDE</td>
<td>Embedded Operating Systems</td>
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<tr>
<td>M04AEE</td>
<td>Robotics – Kinematics, Dynamics and Applications</td>
<td>15</td>
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<tr>
<td>Modules</td>
<td>Description</td>
<td>Credits</td>
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<tr>
<td>M05AEE</td>
<td>Sensor and Measurement Technology</td>
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<td>M06CDE</td>
<td>Wireless Intelligent Systems</td>
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<td>Microprocessor Applications</td>
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<tr>
<td>M08CDE</td>
<td>Individual Project</td>
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## 21 Curriculum Map

<table>
<thead>
<tr>
<th>Module codes</th>
<th>Knowledge and Understanding</th>
<th>Cognitive (Thinking) Skills</th>
<th>Practical Skills</th>
<th>Transferable Skills</th>
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<tbody>
<tr>
<td></td>
<td>KU1</td>
<td>KU2</td>
<td>KU3</td>
<td>KU4</td>
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<tr>
<td>M01CDE Embedded Systems Programming</td>
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<tr>
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<td>M02CDE Digital Communication Systems</td>
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<td>M03CDE Digital Signal and Image Processing</td>
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<td>M04AEE Robotics – Kinematics, Dynamics and Applications</td>
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