Course Specification
Part A

MSc Advanced Mechanical Engineering
ECT048

Faculty of Engineering, Environment and Computing
School of Mechanical, Aerospace and Automotive Engineering
Academic Year: 2019/2020

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.
PART A Course Specification
MSc Advanced Mechanical Engineering

1. Introduction

This advanced course seeks to produce Mechanical Engineering postgraduates with the versatility and depth of understanding to deal with new and unusual challenges in mechanical engineering, alongside the necessary imagination and creativity to innovate.

It is designed to equip postgraduates with relevant, up-to-date skills and advanced knowledge to work as a mechanical engineer in a broad spectrum of mechanical engineering business activity management, research, design and development roles. This will prepare students to pursue successful careers and be leaders in the mechanical engineering related industries.

The MSc Advanced Mechanical Engineering Course is designed to focus on three main themes:

- Design
- Turbomachinery & Renewable Energy
- Management

All themes are balanced across each semester. Design theme modules are well sought mechanical engineering applications in various and diverse engineering sectors. Turbomachinery and power generation theme include both renewable-energy and fossil-fuel energy conversion technologies. The applications of wind and hydro power generation are provided at practical sites. Across these modules, the use of current and advancing computational techniques coupled with teaching informed through collaborative links with industry assures an advanced course fit for current and future industrial needs. Integrated Design Project combines principles from different disciplines on the Course (i.e. synthesis). Students will also carry out an individual project under the guidance of an academic supervisor.

Management theme includes Project Management and Global Professional Development – Creativity, Change and Innovation which is a recognised business module by Chartered Management Institute (CMI). Students will develop their management skills and have the opportunity to gain certificates in consultancy and leadership.

A highly successful feature of this course is its ability to draw on the existing industrial experience of academics and the research generated by our Research Centres in order to cover established and emerging specialisms including, wind and hydro power engineering, turbomachinery and power generation, design and computational simulation of mechanical systems

Research informed teaching is the norm, especially with individual projects. An Activity Led Learning (ALL) approach (student centred) is promoted within the course, with group work introduced to develop transferable skills helping the students to be industry ready. The educational experience also aims to develop students’ intellectual and personal skills, and give them the capability to undertake a practical research study and publish results.

Students on this course have access to the High Performance Engineering Centre (HPEC) which houses a wind tunnel, composites lab, metrology lab, vehicle shaker rig, flow lab, engine test cell, automotive workshop, equipment for fatigue and tensile testing (Instron), laser workshop, a small hydrogen vehicle manufacturing factory, a CRUDEN vehicle simulators, a fully equipped model making shop, a range of CNC machinery and a full size Harrier Jet.

For students in today’s competitive employment markets having work experience can significantly enhance employment prospects. For this reason, the course offers students the opportunity to undertake a work placement, extending the main provision to a two-year course. The work placement could be International or UK with a focus which may be industry or research. Following a selection process within the first semester and subject to securing an approved placement opportunity, students would move onto the two-year course. International students who are interested in a work placement will be supported in completing an application for extending their Tier 4 visa by international student support services. Upon completion of their placement, students will return to complete the course and the final project for the full award.

This course has two entry points, September and January.

Postgraduate career prospects will be wide ranging to include manufacture, design, consultancy and management in mechanical engineering related sectors.
## 2 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 in Advanced Mechanical Engineering</td>
<td>Full-time 1 year</td>
<td>N/A</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>2 years with Work Placement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall-back awards:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PG Diploma in Mechanical Engineering</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PG Certificate (unnamed)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| 3 Awarding Institution/Body                        | Coventry University          |           |            |
| 4 Collaboration                                   | None                         |           |            |
| 5 Teaching Institution and Location of delivery   | Coventry University          |           |            |
| 6 Internal Approval/Review Dates                  | Date of approval/latest review 01/2019 | Date for next review: 2024/2025 |
| 7 Course Accredited by                            | N/A                          |           |            |
| 8 Accreditation Date and Duration                 |                              |           |            |
| 10 Date of Course Specification                    | January 2019                 |           |            |
| 11 Course Director                                 | Dr Erdal Turkbeyler          |           |            |

## 12 Outline and Educational Aims of the Course

This MSc in Advanced Mechanical Engineering aims to provide students with a comprehensive understanding of mechanical engineering and develop knowledge, skills and expertise that can be applied to the mechanical engineering related sectors. The educational experience also aims to develop students’ intellectual and personal skills, and give them the capability to undertake a practical research study and publish results. This will prepare students to pursue careers and be leaders in the mechanical industry.

Specifically, the course aims to:

1. Create an educational environment that enable students to explore the current and emerging technologies and applications and advanced digital tools used in Mechanical Engineering.
2. Provide a global experience and the opportunity for students to advance their engineering proficiency, develop new skills and knowledge.
3. Prepare students to make significant contributions to their professions, the economy and society.
4. Provide students with the opportunity to deal with complex issues, demonstrate self-direction and develop transferable skills, plan self-learning and continuous professional development.
5. Mentor students to be professional in their outlook, be capable of team working, be effective communicators, and be able to exercise responsibility and sound management approaches.

13 Course Learning Outcomes

A student who successfully completes the course will be able to:

1. Demonstrate the advanced level knowledge and understanding of mechanical engineering principles and apply them critically and effectively to solve a substantial range of engineering problems, some of them complex or novel.
2. Critically apply appropriate systematic analysis methods of advanced analytical modelling, numerical simulation and experimental techniques for generating innovative and sustainable mechanical engineering solutions.
3. Develop advanced solutions to meet the current issues and future challenges in design, turbomachinery and renewable energy power generation applications.
4. Apply integrated engineering methods for designing, analysis and optimisation of advanced mechanical components and structural systems for the stability, durability and reliability, including rotary machine components and offshore structures for renewable energy applications.
5. Critically assess information that may be uncertain or incomplete for new and emerging technologies, and collect and analyse research data for tackling unfamiliar engineering problems.
6. Demonstrate critical awareness and the need for professional and ethical conduct in commercial and social contexts together with an understanding of sustainable development and the relevant regulations governing mechanical engineering activities in order to critically appraise risk.
7. Apply the necessary study and research skills to support the analytical, critical and reflective requirements of written, oral and group assessments.
8. Contribute to a team with the necessary planning, reviewing, adaptability, drive and leadership to achieve the required objectives and observe work schedules.
9. Clearly communicate research, concepts, solutions and recommendations, and demonstrate a professional approach to written and/or oral presentations.
10. Demonstrate knowledge and understanding of the principles of consultancy and the theories and practices found in leadership.

14 Course Structure and Requirements, Levels, Modules, Credits and Awards

The MSc Advanced Mechanical Engineering is a 1-year full-time or 3-years part-time course, which will have September and January intakes. The following table is a typical delivery pattern for this course based on the Teach-Teach-Project Cycle being used during the entry year. Personalised timetables will be issued to students prior to their course start date.

<table>
<thead>
<tr>
<th>September Intake</th>
<th>January Intake</th>
<th>Module Code and Module Title</th>
<th>Credit level</th>
<th>Credit Value (Assessment Credit)</th>
<th>Course Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester 1</td>
<td>Semester 2</td>
<td>7040MAA Design Principles and Practice</td>
<td>7</td>
<td>15 (15)</td>
<td>2,3,5,9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7041MAA Engineering Simulation and Analysis</td>
<td>7</td>
<td>15 (15)</td>
<td>1,2,8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7063MAA Wind and Hydro Power Engineering</td>
<td>7</td>
<td>20 (20)</td>
<td>1,2,3,6,8,9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7004CRB Global Professional Development-Creativity, Change and Innovation</td>
<td>7</td>
<td>10 (10)</td>
<td>6,9,10</td>
</tr>
<tr>
<td>Semester 2</td>
<td>Semester 1</td>
<td>7053MAA Thermofluid Systems</td>
<td>7</td>
<td>15 (15)</td>
<td>1,2,3,7,8,9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7054MAA Stress and Dynamics</td>
<td>7</td>
<td>15 (15)</td>
<td>1,2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7055MAA Durability and Reliability of Mechanical Structures</td>
<td>7</td>
<td>15 (15)</td>
<td>1,2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7017MAA Project Management</td>
<td>7</td>
<td>15 (15)</td>
<td>6,7,8,9,10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7100MAA Integrated Design Project</td>
<td>7</td>
<td>0 (10)</td>
<td>1,2,3,4,7,8,9</td>
</tr>
</tbody>
</table>
The course has been designed to meet the Engineering Council, UKSPEC requirements for Masters studies, 2014, with the intention of accreditation by the Institution of Mechanical Engineers after the first Taught-Taught-Project cycle completes.

The programme has an embedded module, Global Professional Development, which has been developed with the Chartered Institute of Management (CMI). Students who successfully complete the module and meet the CMI evidence requirements will gain an L7 Certificate in Strategic Leadership and Management and an L7 Award in Professional Consulting, based on the following units:

1. Strategic Leadership (Unit 7013V1 from the L7 Strategic Management and Leadership qualification)
2. Strategic Leadership Practice (Unit 7014V1 from the L7 Strategic Management and Leadership qualification)
3. Tools and Techniques for Effective Consultancy (Unit 7031 from the L7 Professional Consulting qualification)

This will enable students to apply for Chartered Manager status via the qualified route, once the other entry criteria have been met.

During semester 1, students who have expressed an interest in undertaking a work placement should begin the application process for placement opportunities. Students have the responsibility for securing a placement, but they will be supported throughout the application process by a specialist employer engagement team. The university will work with employers to identify opportunities. Subject to securing a placement, the International Student Support team will work with international students to obtain UK study visa extensions. Visas required to work in other countries will be the responsibility of the student.

The course is structured so that students complete two semesters of taught modules and then spend three semesters on placement. During this time students would be enrolled onto modules 7102CEM Extended Masters Work Placement A, 7103CEM Extended Masters Work Placement B and 7104CEM Extended Masters Work Placement C. The modules are zero credit and do not contribute to the classification or name of the award but must be passed to complete the placement. Upon completion of the work placement, students are expected to return to Coventry to complete the final semester during which time they undertake their project module. Successful completion of the Work Placement is reflected in the final student transcript.

<table>
<thead>
<tr>
<th>Credit Level</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>7</td>
<td>7102CEM</td>
<td>Extended Masters Work Placement A</td>
<td>0</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>7103CEM</td>
<td>Extended Masters Work Placement B</td>
<td>0</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>7104CEM</td>
<td>Extended Masters Work Placement C</td>
<td>0</td>
<td>Optional</td>
<td></td>
</tr>
</tbody>
</table>

The work placement is to be taken over three semesters and prior to the final semester of the course.

Cascade of Awards:

The requirements for progression and awards:

Awards for Taught Masters programmes may be made with Distinction or with Merit as per the Academic Regulations.

- **MSc Advanced Mechanical Engineering** – The full curriculum (180 credits)
- **PG Diploma Mechanical Engineering** – 120 credits from the programmes (any modules, excluding 7018MAA)
- **PG Certificate** – 60 credits from the programme (excluding 7018MAA)
15 Criteria for Admission and Selection Procedure

The entry criteria for the programme correspond to the QAA Benchmark Statements (2015).

To commence the full-time MSc Advanced Mechanical Engineering course, applicants must:

- Be an honours graduate of Mechanical, Automotive or related engineering discipline (minimum 2:2 or higher), obtained from a recognised university/HE institution, or hold an equivalent qualification acceptable to Coventry University
- Hold IELTS 6.5 or equivalent if English is not the applicant’s first language.

Students who do not fit with the above entry requirements can gain entry but their degrees and experience will be assessed for appropriate content by the course director.

There is an accreditation for Prior Learning (APL) process available which is in accordance with University regulations for taught postgraduate courses. The accreditation for Prior Experiential learning (APEL) will only be awarded for achievements equivalent to master’s level. AP(E)L will be assessed in line with University Regulations.

16 Academic Regulations and Regulations of Assessment

This course conforms to the standard University Regulations Mode R.


**17 Indicators of Quality Enhancement**

The Course is managed by the School of Mechanical, Aerospace and Automotive Engineering 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 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/School Board, all of which normally meet two or three times per year.

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

The QAA's Higher Education Review undertaken in February 2015 confirmed that Coventry University meets the UK expectations regarding the:

- setting and maintenance of the academic standards of awards
- quality of student learning opportunities
- quality of the information about learning opportunities
- enhancement of student learning opportunities

This Engineering Course has been designed in accordance with the:

- QAA Engineering Subject Benchmark statement [February 2015]
- UK Standards for Professional Engineering Competence [Third Edition]
- Engineering Council Accreditation of Higher Education Programmes

The School of Mechanical, Aerospace and Automotive Engineering

- The MSc Advanced Mechanical Engineering course sits within the School of Mechanical, Aerospace and Automotive Engineering.
- The School works closely with the Institution of Mechanical Engineers and other professional bodies who inform on the curriculum.
- The School engages in a wide variety of research and attracts governmental funding
- The School engages with industry through advisory boards to inform curriculum design

The School conducts themed research within a number of Research Centres:

- The Institute for Future Cities and Transport
- The Centre for Fluid and Complex Systems
- The Institute of Advanced Manufacturing Engineering
18 Additional Information

Enrolled students have access to additional key sources of information about the course and student support. This information can be found in:

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