

MSc Advanced Mechanical Engineering

This document provides a definitive record of the main features of the programme and the learning outcomes that a typical student may reasonably be expected to achieve and demonstrate if s/he takes full advantage of the learning opportunities provided. This programme specification is intended as a reference point for prospective students, current students, external examiners and academic and support staff involved in delivering the programme and enabling student development and achievement.

Programme Information

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|--|--|--------|------------|-----|
| Programme Title | Advanced Mechanical Engineering | | | |
| Award(s) | MSc | | | |
| Programme Code | H3U8 | H3U824 | H3U836 | |
| Awarding Institution | Imperial College London | | | |
| Teaching Institution | Imperial College London | | | |
| Faculty | Faculty of Engineering | | | |
| Department | Department of Mechanical Engineering | | | |
| Associateship | City and Guilds of London Institute (ACGI) | | | |
| Main Location of Study | South Kensington Campus | | | |
| Mode and Period of Study | 1 academic year, full-time 2 or 3 academic years, part-time | | | |
| Cohort Entry Points | Annually in October | | | |
| Relevant QAA Benchmark Statement(s) and/or other external reference points | Master's Degrees in Engineering | | | |
| Total Credits | ECTS: | 90 | UK Credit: | 180 |
| FHEQ Level | Level 7 | | | |
| EHEA Level | 2 nd cycle | | | |
| External Accreditor(s) | N/A | | | |
| Specification Details | | | | |
| Student cohorts covered by specification | 2020-21 entry | | | |
| Person responsible for the specification | Ulrich Hansen, Director AME Course | | | |
| Date of introduction of programme | | | | |

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| Date of programme specification/revision | Sept 2020 |
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Programme Overview

The MSc course provides students with a knowledge and understanding of the 'state-of-the-art' in one or more of the many areas of mechanical engineering in which the Department has acknowledged expertise. This combines with the potential for students to develop their abilities in subjects such as numerical analysis and signal processing, which are useful in all areas of mechanical engineering and are associated with the application of computers in engineering practice.

The principal component of the course is the individual project, which is usually associated with current research activity or industrial consultancy, allowing you to gain substantial expertise in one particular area.

Further expertise is developed by taking taught course modules. Students can study an unusually broad range of subjects in the Department as a result of our position as one of the largest university engineering departments in the UK.

The success of the course can be measured by the large proportion of graduates who go on to find appropriate and challenging posts in industry, government, and universities at home and abroad.

Learning Outcomes

The Imperial Graduate Attributes are a set of core competencies which we expect students to achieve through completion of any Imperial College degree programme. The Graduate Attributes are available at: www.imperial.ac.uk/students/academic-support/graduate-attributes

Knowledge and Understanding of:

- To understand and be able to apply effectively theories, principles and concepts to advanced engineering research and other projects.
- To have an advanced understanding of engineering, science, mathematics and other engineering science disciplines needed for advanced engineering problem solving.

Intellectual Skills

- To assimilate, digest and interpret information.
- To show good reasoning and creativity in the solutions of theoretical and practical problems.
- To be able to integrate information and numerical data from different sources and relate them appropriately to a task.
- To show flair in performing experimental and other project work. Also, in the analysis of findings and the presentation of reports.
- To plan, conduct and write up a programme of research.

Practical Skills

- To plan and execute effectively a series of experiments, projects and other coursework with the safe use of laboratory, workshop and other equipment.
- To analyse experimental results and determine their strength and validity.
- To develop the use of computers and computer programmes.
- To show competence in the design of experimental rigs and the use of workshop tools and machines where necessary.

Professional Skills

- To communicate effectively by oral presentations, written reports and a research dissertation.
- To read across from one subject to another and from one problem to another.
- To build on ideas of others when working as a team.
- To learn effectively for the purpose of continuing professional development.

Entry Requirements

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|------------------------------|--|
| Academic Requirement | Normally a strong first class (1st) UK Bachelor's Degree with Honours in Engineering or Science (or a comparable qualification recognised by the College). |
| Non-academic Requirements | None |
| English Language Requirement | Standard requirement IELTS score of 6.5 overall (minimum 6.0 in all elements) |

The programme's competency standards document can be found at:

https://bb.imperial.ac.uk/webapps/blackboard/content/listContent.jsp?course_id=6309_1&content_id=540

Learning & Teaching Strategy

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|---|---|
| Scheduled Learning & Teaching Methods (subject to Covid situation) | <ul style="list-style-type: none">• Lectures• Problem sheets• Tutorials• Laboratory Work |
| E-learning & Blended Learning Methods | <ul style="list-style-type: none">• Online teaching |
| Project and Placement Learning Methods (subject to Covid situation) | <ul style="list-style-type: none">• Group practical exercises• Research Project |

Assessment Strategy

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| Assessment Methods | <ul style="list-style-type: none">• Written Exams• Coursework |
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Academic Feedback Policy

Where appropriate, feedback will be provided within 10 working days of submission of a piece of coursework. In circumstances where this is not possible, students will be notified in advance.

Re-sit Policy

The College's Policy on Re-sits is available at: <http://www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/>

Mitigating Circumstances Policy

The College's Policy on Mitigating Circumstances is available at: <http://www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/>

Programme Structure

| Full-time | Term One | Term Two | Term Three | Term Four |
|----------------------|----------|----------|------------|-----------|
| Core Modules | 0 | 0 | 0 | 0 |
| Elective Modules | 7 | 7 | 0 | 0 |
| Projects | 1 | 1 | 1 | 1 |
| Part-time (Year One) | Term One | Term Two | Term Three | Term Four |
| Core Modules | 0 | 0 | 0 | 0 |
| Elective Modules | 5 | 5 | 0 | 0 |
| Projects | 0 | 0 | 0 | 0 |
| Part-time (Year Two) | Term One | Term Two | Term Three | Term Four |
| Core Modules | 0 | 0 | 0 | 0 |
| Elective Modules | 2 | 2 | 0 | 0 |
| Projects | 1 | 1 | 1 | 1 |

Assessment Dates & Deadlines

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|------------------------|---------------|
| Written Examinations | April-May |
| Coursework Assessments | Continuous |
| Project Deadlines | Mid-September |
| Practical Assessments | Continuous |

Assessment Structure

Marking Scheme

Pass

A candidate must:

- Pass the taught courses element part of the course by passing in seven subjects assessed by examination and coursework with an overall mark for each subject taken of 50% or above; and
- Pass the research project element of the course with a mark of 50% or above.

Merit

A candidate must:

- Pass both the Taught Courses element and the Research Project element each with an overall average mark of 60% or above.
- A student who achieves an overall average mark for the MSc course as whole of 60% or above, and who passes both the Taught Courses and Research Project each with an overall average mark of 50% or above may at the discretion of the Board of Examiners be recommended to pass with Merit.

Distinction

A candidate must:

- Pass both the Taught Courses element and the Research Project element each with an overall average mark of 70% or above.
- A student who achieves an overall average mark for the MSc course as whole of 70% or above, and who passes both the Taught Courses and Research Project each with an overall average mark of 60% or above may at the discretion of the Board of Examiners be recommended to pass with Distinction.

| Module Weightings | |
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| Module | % Module Weighting |
| 7 x modules made up from groups (B) and (C) at least five of which must be from Group (C) <u>OR</u> 1 module from group (A) and 5 x modules from group (B) and (C) at least three of which must be from Group (C) | 50% |
| Research Project | 50% |

| Indicative Module List | | | | | | | | | | | |
|------------------------|--|-------------------|--------------|------------------------|-------------------------|----------------|----------------------|----------------------|----------------|---------------|------|
| Code | Title | Core/ Elective | L&T Hours | Ind. Study Hours | Place- ment Hours | Total Hours | % Written Exam | % Course- work | % Practical | FHEQ Level | ECTS |
| | Research Project | CORE | 60 | 1065 | 0 | 1125 | 0 | 100 | 0 | 7 | 45 |
| ME4-MAET | Aircraft Engine Technology | ELECTIVE (A) | 42 | 258 | 0 | 300 | 50 | 50 | 0 | 7 | 12 |
| ME4-MMPT | Metal Processing Technology | ELECTIVE (A) | 47 | 252 | 0 | 300 | 50 | 50 | 0 | 7 | 12 |
| ME4-MMTT | Mechanical Transmission Technology | ELECTIVE (A) | 42 | 258 | 0 | 300 | 50 | 50 | 0 | 7 | 12 |
| ME4-MFCTT | Future Clean Transport Technology | ELECTIVE (A) | 42 | 258 | 0 | 300 | 50 | 50 | 0 | 7 | 12 |
| ME3-HCCM | Computational Continuum Mechanics | ELECTIVE (B) | 27 | 123 | 0 | 150 | 100 | 0 | 0 | 6 | 6 |
| ME3-HFFM | Fundamentals of Fracture Mechanics | ELECTIVE (B) | 31 | 119 | 0 | 150 | 100 | 0 | 0 | 6 | 6 |
| ME3-HNUCN | Introduction to Nuclear Energy | ELECTIVE (B) | 30 | 120 | 0 | 150 | 100 | 0 | 0 | 6 | 6 |
| ME3-HSPAP | Structure, Properties and Applications of Polymers | ELECTIVE (B) | 25 | 125 | 0 | 150 | 100 | 0 | 0 | 6 | 6 |
| ME3-HMTM | Manufacturing Technology and Management | ELECTIVE (B) | 39 | 111 | 0 | 150 | 50 | 25 | 25 | 6 | 6 |
| ME3-HTRB | Tribology | ELECTIVE (B) | 27 | 123 | 0 | 150 | 75 | 25 | 0 | 6 | 6 |
| ME4-MASA | Advanced Stress Analysis | ELECTIVE (C) | 33 | 142 | 0 | 175 | 100 | 0 | 0 | 7 | 7 |

| Indicative Module List | | | | | | | | | | | |
|------------------------|--|-------------------|--------------|------------------------|-------------------------|----------------|----------------------|----------------------|----------------|---------------|------|
| Code | Title | Core/ Elective | L&T Hours | Ind. Study Hours | Place- ment Hours | Total Hours | % Written Exam | % Course- work | % Practical | FHEQ Level | ECTS |
| ME4-MCNTL | Advanced Control | ELECTIVE (C) | 26 | 149 | 0 | 175 | 100 | 0 | 0 | 7 | 7 |
| ME4-MAVE | Advanced Vibration Engineering | ELECTIVE (C) | 22 | 153 | 0 | 175 | 60 | 30 | 10 | 7 | 7 |
| ME4-MCMB | Combustion | ELECTIVE (C) | 21 | 154 | 0 | 175 | 100 | 0 | 0 | 7 | 7 |
| ME4-MCFD | Computational Fluid Dynamics | ELECTIVE (C) | 25 | 150 | 0 | 175 | 25 | 75 | 0 | 7 | 7 |
| ME4-MCPM | Composite Materials | ELECTIVE (C) | 25 | 150 | 0 | 175 | 100 | 0 | 0 | 7 | 7 |
| ME4-MMCL | Machine Learning | ELECTIVE (C) | 30 | 145 | 0 | 175 | 50 | 0 | 50 | 7 | 7 |
| ME4-MFEAA | Finite Element Analysis and Applications | ELECTIVE (C) | 24 | 151 | 0 | 175 | 60 | 20 | 20 | 7 | 7 |
| ME4-MNDP | Interfacing and Data Processing | ELECTIVE (C) | 32 | 143 | 0 | 175 | 60 | 40 | 0 | 7 | 7 |
| ME4-MNURP | Nuclear Reactor Physics | ELECTIVE (C) | 32 | 143 | 0 | 175 | 100 | 0 | 0 | 7 | 7 |
| ME4-MNUTH | Nuclear Thermal Hydraulics | ELECTIVE (C) | 32 | 143 | 0 | 175 | 100 | 0 | 0 | 7 | 7 |

Supporting Information

The Programme Handbook is available at:

<https://share.imperial.ac.uk/foe/MechEng/pgadmin/PG%20Document%20Repository/Advanced%20Mechanical%20Engineering%20Handbook%202016-17.pdf>

The Module Handbook is available at: N/A

The College's entry requirements for postgraduate programmes can be found at:

www.imperial.ac.uk/study/pg/apply/requirements

The College's Quality & Enhancement Framework is available at:

<http://www.imperial.ac.uk/about/governance/academic-governance/senate-subcommittees/>

The College's Academic and Examination Regulations can be found at:

<http://www.imperial.ac.uk/about/governance/academic-governance/regulations/>

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<http://www.imperial.ac.uk/admin-services/secretariat/college-governance/charters-statutes-ordinances-and-regulations/>

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