

Programme Information		
Programme Title	Programme Code	HECoS Code
Mechanical Engineering with Nuclear Engineering	For Registry Use Only	For Registry Use Only

Award	Length of Study	Mode of Study	Entry Point(s)	Total Credits	
				ECTS	CATS
MEng	4 Years	Full Time	N/A	240	480

This programme is not available for entry. All students must apply to and join the Mechanical Engineering MEng and transfer from within. Specific requirements for transferring to this programme are outlined in the Progression and Classification section at the end of this document.

Ownership			
Awarding Institution	Imperial College London	Faculty	Faculty of Engineering
Teaching Institution	Imperial College London	Department	Mechanical Engineering
Associateship	City and Guilds Institute	Main Location(s) of Study	South Kensington Campus

External Reference	
Relevant QAA Benchmark Statement(s) and/or other external reference points	Honours Degree in Engineering
FHEQ Level	Level 7 - Honours
EHEA Level	2nd Cycle

External Accreditor(s) (if applicable)			
External Accreditor:	Institute of Mechanical Engineers		
Accreditation received:	2016	Accreditation renewal:	2021

Collaborative Provision			
Collaborative partner	Collaboration type	Agreement effective date	Agreement expiry date
N/A	N/A	N/A	N/A

Specification Details	
Programme Lead	Dr Michael J Bluck
Student cohorts covered by specification	2019-20 entry

Date of introduction of programme	September 19
Date of programme specification/revision	January 19

Programme Overview

The MEng Mechanical Engineering with Nuclear Engineering programme seeks to educate and enthuse future engineers, resulting in graduate students with technical expertise matched with professionalism and creativity, with a specialism in nuclear. The programme consists of technical, practical and professional skills modules in multiples of 5 ECTS.

In the first year you will develop a basic understanding across a range of technical modules in three technical themes; solid mechanics, thermofluids and mechatronics. The realisation of the engineering product and the understanding and practice of design is introduced in the Design and Manufacture module. Mathematics and computing are vital languages in engineering and your skills are developed in support of the technical themes. An engineer must operate in a commercial environment and the professional skills module develops and equips you student with the necessary understanding and experience through practice.

The second year is a continuation of the first, further developing your expertise across the three technical disciplines, design and manufacture, supporting mathematics and computing and professional skills. These two core years establish a strong technical and professional base for subsequent years.

The third and fourth years enable you to tailor the programme to your own ambitions and establish mastery in the nuclear theme. In year 3, students take core modules in Introduction to Nuclear Energy and Nuclear Chemical Engineering. You will also broaden and deepen your understanding through a wide range of additional technical and commercial electives. In year 3, the group Design, Make and Test project brings together your technical skills and develops creativity and innovation in a team-working environment, requiring you to produce reports, posters and presentations. Also in year 3, the Literature Research Project (LRP) (a component of the Professional Skills module) develops your critical analysis and report writing skills. In year 4, the core component includes Nuclear Reactor Physics, Nuclear Thermal Hydraulics and Nuclear Materials. You will broaden and deepen your understanding through a wide range of additional electives and establish a deep understanding of one selected advanced industrial application (Advanced Applications (AA) module). Also in year 4, the individual project is an opportunity for you to develop and demonstrate a deep understanding in a key research area with sole responsibility through close supervision by academic staff who are experts in their fields.

As a graduate of this programme you will be equipped with the skills to find solutions to real-life problems with conflicting requirements. The employment trajectories of our graduates are very diverse. Many find work in consultancy, tackling an ever-changing variety of tasks. The technical and management skills of the discipline are equally valued in the commercial world, where they work together to sharpen the competitive edge. Some of our graduates elect to remain in academia to contribute to research and the education of future generations. The degree programme is accredited by the Institution of Mechanical Engineers as the basis for Chartered Engineer status.

Learning Outcomes

On completion of the programme, you will have acquired a broad base of engineering knowledge and experience. You will have developed a depth of expertise in one or more major engineering discipline(s). You should be self-reliant, professional and able to contribute well in team situations. The programme aims to provide the flexibility for you to choose a wide variety of career paths and specialisms in the third and fourth years. More specifically you will be able to:

Level 4-7:

1. Demonstrate a basic appreciation of engineering principles, laboratory and experimental methods, quantitative methods and the ability to solve engineering problems and evaluate uncertainties.
2. Explain and use advanced mathematics and knowledge of the fundamentals of mechanics, mechatronics and thermofluids associated with a career in mechanical engineering.
3. Explain, develop and use mathematical and computer models for the analysis of engineering systems.

4. Select engineering materials, equipment and processes and demonstrate a familiarity with basic professional mechanical workshop practices.
5. Design, manufacture and test engineering devices, using creative processes, design processes, methodologies and team working.
6. Explain the use of codes of practice, industry standards and quality issues as applicable to a general mechanical engineering career.
7. Recommend and select management techniques appropriate for a career in engineering and demonstrate an understanding of the professional, commercial and economic context of the engineering business.
8. Report technical ideas, results and data in a clear professional manner.
9. Research and critically evaluate concepts and evidence; apply diagnostic and creative skills and exercise significant judgement and accept accountability for determining and achieving personal and/or group outcomes.
10. Demonstrate a knowledge of intellectual property issues and of environmental, legal and ethical issues within the modern professional industrial world.
11. Demonstrate a knowledge and understanding of a range of engineering subjects and a deep understanding of at least one major engineering discipline.
12. Demonstrate mastery of the fundamental concepts and processes underlying nuclear engineering and of its industrial importance.
13. Demonstrate and apply knowledge and understanding of the state-of-the-art in a range of engineering subjects and have the ability to analyse complex data and to simulate and model relevant scenarios.
14. Demonstrate advanced skills to conduct research, or advanced technical activity, proposing solutions, modelling scenarios and accepting accountability for related decision making.

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

Entry Requirements

Academic Requirement	<p>A Levels A* Maths, A* Physics, A in another subject (Further Maths (3 subjects) useful but not essential).</p> <p>A Levels A* Maths, A Physics, A in two other subjects (Further (4 subjects) Maths useful but not essential).</p> <p>IB 40 overall, 6 Maths (HL), 6 Physics (HL), 6 other (HL)</p> <p>For further information on entry requirements, please go to https://www.imperial.ac.uk/study/ug/apply/requirements/ugacademic/</p>
Non-academic Requirements	N/A
English Language Requirement	<p>Standard requirement</p> <p>Please check for other Accepted English Qualifications</p>
Admissions Test/Interview	Where possible, shortlisted applicants are invited for interview.

The programme's competency standards documents can be found at: https://bb.imperial.ac.uk/webapps/blackboard/content/listContent.jsp?course_id=6309_1&content_id=540708_1

Learning & Teaching Approach

Teaching

You will be taught through a combination of, lectures, tutorials, team-based learning, laboratory demonstrations, experiments, practical classes, guest lectures and presentations. Lectures make use of recording and a number of interactive technologies including experimental demonstrations. Tutorials will enable you to discuss and develop your understanding of topics covered in lectures whilst in smaller groups of around 16 students. Team-based learning is used in creative and design-oriented study and laboratory demonstrations and experiments support your theoretical knowledge developed in lectures and tutorials.

Independent learning

You are expected to spend significant time on independent study outside of face to face contact time. This will typically include accessing and interacting with resources online, reading journal articles and books, undertaking research in the library, reviewing lecture notes and watching lecture recordings, working on individual and group projects, working on coursework assignments, solving tutorial questions and revising for exams.

Where appropriate, and specifically for practical and laboratory-based modules, use is made of flipped teaching, meaning that you will need to actively engage with on-line materials ahead of attending timetabled sessions. This independent learning is followed by sessions where you will work in small groups to apply that knowledge in practice, thereby further consolidating and enhancing understanding of the topics studied.

Research projects and literature reviews

You are given numerous opportunities to consider specific problems of interest to you. In the Literature Review Project, Design, Make and Test project and Final Year Project you can select from a very broad range of projects, including technical, commercial, economic and socio-political topics. You can also self-propose a topic, subject to agreement with the supervisor. A substantive part of the project/your study can be self-proposed across the programme.

Overall Workload

The overall workload consists of face-to-face sessions, independent and team-based learning. While actual contact hours may vary according to the optional modules students choose to study, the following gives an indication of how much time you will need to allocate to different activities at each level of the programme. At Imperial, each [ECTS credit](#) taken equates to an expected total study time of 25 hours. Therefore, the expected total study time is normally 1500 hours per year.

Typically, in the first two years (levels 4 and 5) you will spend around 20% of the time on lectures, seminars and other scheduled activity (around 300 hours) and around 80% of the time on independent study (around 1200 hours).

In the fourth and fifth years (level 6 and 7), you will spend less time in lectures, seminars or other scheduled activity (around 60 hours). Instead, the rest of the time will be split evenly between independent study and project work (approximately 600 hours on each).

Assessment Strategy

Assessment Methods

You can expect a variety of different types of assessment methods:

Written assessment

- Examinations
- Progress tests
- Online assignments, quizzes and tests
- Report writing
- Peer assessment

Practical assessment

- Laboratory/workshop practicals

- Programming tests
- CAD & simulation tool tests

Oral assessment

- Oral presentations
- Poster presentations
- Group presentations
- Design exhibitions

The programme allows you to test understanding of the subject informally before you complete the formal summative assessments that count towards your final mark. These summative assessments allow you to demonstrate that you have met the intended learning outcomes for each module and contribute towards your achievement of the programme learning outcomes, detailed above. There is formal summative assessment during and/or at the end of each module. Examinations are intended to assess understanding rather than recall. Group assessments may incorporate peer marking.

Balance of assessment

The percentages below are based on a typical pathway through the course and have been rounded to the nearest whole number.

	Year 1	Year 2	Year 3	Year 4
Coursework	20%	20%	40%	45%
Practical	5%	5%	5%	5%
Examination	75%	75%	55%	50%

Academic Feedback Policy

Feedback is provided through a number of formats, including:

- Oral (e.g. face to face during or after face-to-face sessions, video)
- Personal (e.g. discussion with staff)
- Interactive (e.g. Team Based Learning, peer-to-peer, online quizzes)
- Written (e.g. solutions, model answers, comments on work which can be used as feedforward)

You will receive feedback on intermediate, developmental assessments such as project plan and progress reports and on coursework assessments. Feedback on examination performance is available upon request from the module leader and overall class performance feedback on a question-by-question basis is also provided. Feedback is intended to help you learn and you are encouraged to discuss it with your module tutor. Feedback will be provided on coursework and practical assessments within 2 weeks of submission.

The College's Policy on Academic Feedback and guidance on issuing provisional marks to students is available at:

www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/

Re-sit Policy

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

Additional Programme Costs

This section should outline any additional costs relevant to this programme which are not included in students' tuition fees.

Description	Mandatory/Optional	Approximate cost
N/A	N/A	N/A

Important notice: The Programme Specifications are the result of a large curriculum and pedagogy reform implemented by the Department and supported by the Learning and Teaching Strategy of Imperial College London. The modules, structure and assessments presented in this Programme Specification are correct at time of publication but might change as a result of student and staff feedback and the introduction of new or innovative approaches to teaching and learning. You will be consulted and notified in a timely manner of any changes to this document.

Programme Structure ¹					
Year 1 – FHEQ Level 4 Students study all core modules.					
Code	Module Title	Core/ Elective	Group*	Term	Credits
MECH4 0008	Mathematics and Computing 1	Core	N/A	1,2	15
MECH4 0001	Professional Engineering Skills 1	Core	N/A	1,2	5
MECH4 0005	Stress Analysis 1	Core	N/A	1,2,3	5
MECH4 0009	Mechanics	Core	N/A	1,2,3	5
MECH4 0006	Materials 1	Core	N/A	1,2,3	5
MECH4 0002	Fluid Mechanics 1	Core	N/A	1,2,3	5
MECH4 0003	Thermodynamics 1	Core	N/A	1,2,3	5
MECH4 0004	Mechatronics 1	Core	N/A	1,2,3	5

¹ **Core** modules are those which serve a fundamental role within the curriculum, and for which achievement of the credits for that module is essential for the achievement of the target award. Core modules must therefore be taken and passed in order to achieve that named award. **Compulsory** modules are those which are designated as necessary to be taken as part of the programme syllabus. Compulsory modules can be compensated. **Elective** modules are those which are in the same subject area as the field of study and are offered to students in order to offer an element of choice in the curriculum and from which students are able to select. Elective modules can be compensated.

MECH4 0007	Design and Manufacture 1	Core	N/A	1,2,3	10
Credit Total					60
Year 2 - FHEQ Level 5 Students study all core modules.					
Code	Module Title	Core/ Elective	Group	Term	Credits
	Mathematics and Computing 2	Core	N/A	1,2	10
	Professional Engineering Skills 2	Core	N/A	1,2	5
	Stress Analysis 2	Core	N/A	1,2,3	5
	Dynamics	Core	N/A	1,2,3	5
	Materials 2	Core	N/A	1,2,3	5
	Fluid Mechanics 2	Core	N/A	1,2,3	5
	Thermodynamics 2	Core	N/A	1,2,3	5
	Heat Transfer	Core	N/A	1,2,3	5
	Mechatronics 2	Core	N/A	1,2,3	5
	Design and Manufacture 2	Core	N/A	1,2,3	10
Credit Total					60
Year 3 - FHEQ Level 6 Students study all core and compulsory modules. Students must study both modules in at least one of groups A-C, and two additional modules from groups A-D. Note that no level 7 module (variant B) may be studied for credit where the corresponding level 6 module (variant A) has already been studied for credit. Note that a range of electives will be available in a given year and students will be given advance notice of which options are available to them ahead of making module choices.					
Code	Module Title	Core/ Elective	Group	Term	Credits
	Professional Engineering Skills 3	Core	N/A	1,2	10
	Design, Make and Test Project	Core	N/A	1,2,3	20
	Introduction to Nuclear Energy	Core	N/A	1	5
	Nuclear Chemical Engineering	Core	N/A	2	5
	Stress Analysis 3A	Elective	A	1,2	5
	Fracture Mechanics A	Elective	A	1,2	5
	Thermodynamics 3A	Elective	B	1,2	5
	Fluid Mechanics 3A	Elective	B	1,2	5
	Mechatronics 3A	Elective	C	1,2	5
	Machine Dynamics and Vibrations A	Elective	C	1,2	5

	Embedded C for Microcontrollers A	Elective	D	1,2	5
	Design, Art and Creativity A	Elective	D	1	5
	System Design and Optimisation A	Elective	D	1,2	5
	Structure, Properties and Application of Polymers A	Elective	D	1,2	5
	Computational Continuum Mechanics A	Elective	D	1	5
	Finite Element Analysis and Applications A	Elective	D	1,2	5
	Manufacturing Technology and Management A	Elective	D	1,2	5
	Tribology A	Elective	D	1,2	5
	Mathematics A	Elective	D	1,2	5
	Statistics A	Elective	D	1,2	5
	I-Explore (Level 5/6)	Compulsory	E	1 &/or 2	5
Credit Total					60

Year 4 - FHEQ Level 7

Students study all core modules. Students must study exactly one module from group A and two modules from groups B-C. No level 7 module (variant B) may be studied for credit where the corresponding level 6 module (variant A) has already been studied for credit. Note that a range of electives will be available in a given year and students will be given advance notice of which options are available to them ahead of making module choices.

Code	Module Title	Core/ Elective	Group	Term	Credits
	Individual Project	Core	N/A	1,2,3	25
	Nuclear Reactor Physics	Core	N/A	2	5
	Nuclear Thermal Hydraulics	Core	N/A	1	5
	Nuclear Materials	Core	N/A	1	5
	Aircraft Engine Technology	Elective	A	1,2	10
	Metal Processing Technology	Elective	A	1,2	10
	Future Clean Transport Technology	Elective	A	1,2	10
	Mechanical Transmissions Technology	Elective	A	1,2	10
	Advanced Control	Elective	B	1,2	5
	Advanced Stress Analysis	Elective	B	1,2	5
	Applied Vibration Engineering	Elective	B	1,2	5
	Combustion Science	Elective	B	1,2	5
	Computational Fluid Dynamics	Elective	B	1,2	5
	Composite Materials	Elective	B	1,2	5

	Interfacing and Data Processing	Elective	B	1,2	5
	Design, Art and Creativity B	Elective	B	1	5
	Stress Analysis 3B	Elective	B	1,2	5
	Fracture Mechanics B	Elective	B	1,2	5
	Fluid Mechanics 3B	Elective	B	1,2	5
	Embedded C for Microcontrollers B	Elective	B	1,2	5
	System Design and Optimisation B	Elective	B	1,2	5
	Computational Continuum Mechanics B	Elective	B	1	5
	Finite Element Analysis and Applications B	Elective	B	1,2	5
	IDX†	Elective	C	1,2	5
Credit Total					60

* 'Group' refers to module grouping (e.g. a group of electives from which one/two module(s) must be chosen).

†There are multiple IDX modules available: <https://www.imperial.ac.uk/engineering/study/current/inter-departmental-exchange-idx/>

Progression and Classification

Transferring to the with Nuclear Engineering programme

All students must apply to and join the Mechanical Engineering MEng. You will be able to transfer to this programme up at any point, provided you have chosen the electives which meet core requirements outlined in the module table.

Progression

Requirements for progression between years of study and for classifications of degrees are provided in the Academic Regulations (2019/20)

If a candidate fails any core modules at the first attempt, the Examining Board may, against criteria determined on a year by year basis, record a Deferred Decision and require reassessment(s).

There is a limit on compensation of electives (years 3 and 4) of 15 ECTS in total across the programme.

Classification

The marks from modules in each year contribute towards the final degree classification.

In order to be considered for an award, students must have achieved the minimum number of credits at the required levels prescribed for that award and met any programme specific requirements as set out in the Programme Specification.

Classification will be determined through:

- i) Aggregate Module marks for all modules
- ii) Year Weightings

For this award, Year One is weighted at 7.50%, Year Two at 20.00%, Year Three at 36.25% and Year Four at 36.25%.

The College sets the class of undergraduate degree that may be awarded as follows:

- | | | |
|------|--------------|---|
| i) | First | 70.00% or above for the average weighted module results |
| ii) | Upper Second | 60.00% or above for the average weighted module results |
| iii) | Lower Second | 50.00% or above for the average weighted module results |
| iv) | Third | 40.00% or above for the average weighted module results |

Please find the full Academic Regulations at <https://www.imperial.ac.uk/about/governance/academic-governance/regulations/>. Please follow the prompts to find the set of regulations relevant to your programme of study.

Programme Specific Regulations

As an accredited degree, students on the MEng programme are subject to the standards set by the Engineering Council in relation to compensation: a maximum of 15 ECTS credits can be compensated across the entire programme.

Supporting Information
The Programme Handbook is available at: N/A
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: www.imperial.ac.uk/registry/proceduresandregulations/qualityassurance
The College's Academic and Examination Regulations can be found at: www.imperial.ac.uk/about/governance/academic-governance/regulations
Imperial College is an independent corporation whose legal status derives from a Royal Charter granted under Letters Patent in 1907. In 2007 a Supplemental Charter and Statutes was granted by HM Queen Elizabeth II. This Supplemental Charter, which came into force on the date of the College's Centenary, 8th July 2007, established the College as a University with the name and style of "The Imperial College of Science, Technology and Medicine". www.imperial.ac.uk/admin-services/secretariat/college-governance/charters/
Imperial College London is regulated by the Office for Students (OfS) www.officeforstudents.org.uk/advice-and-guidance/the-register/
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 primarily intended as a reference point for prospective and current students, academic and support staff involved in delivering the programme and enabling student development and achievement, for its assessment by internal and external examiners, and in subsequent monitoring and review.

Modifications			
Description	Approved	Date	Paper Reference
N/A	N/A	N/A	N/A