Imperial College London

Programme Specification (Undergraduate)

MEng 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				
Award(s)	MEng			
Programme Title	Mechanical Engineering			
Programme code	H301			
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)			
Mode and Period of Study	4 academic years full-time			
Cohort Entry Points	Annually in October			
Relevant QAA Benchmark Statement(s) and/or other external reference points	Honours Degrees in Engineering and Master's Degrees in Engineering			
Total Credits	ECTS:	240	UK Credit:	480
FHEQ Level	Level 7			
EHEA Level	2nd cycle			
External Accreditor(s)	Institution of Mechanical Engineers (IMechE)			
Specification Details				
Student cohorts covered by specification	2016-17 Entry			
Person responsible for the specification	Michael Bluck			
Date of introduction of programme				
Date of programme specification/revision	September 2016			

Description of Programme Contents

This 4 year MEng programme comprises an entirely core programme across years 1 and 2. In year 3, the course comprises a core component, which includes project work – individually for the literature review and in groups for the DMT. The remaining year 3 component comprises a number of elective subjects. In year 4, the only core component is the individual project. The remaining year 4 components comprises a number of elective subjects, of which one must be an advanced applications course. All teaching is carried out at the South Kensington campus and teaching staff are fully experience and usually world leading experts in their fields. Project work frequently involves working with industrial partners.

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:

- Scientific principles and methodologies which underpin mechanical and other engineering disciplines, enable appreciation of its scientific and engineering context, and support the understanding of future developments and technologies.
- Mathematical principles necessary to underpin their education in mechanical and related engineering disciplines and to enable them to apply mathematical methods, tools and notations proficiently in the analysis and solution of engineering problems
- Mathematical models relevant to the mechanical and related engineering disciplines, and an appreciation of their limitations
- Concepts from a range of areas, including some outside engineering, and the ability to apply them effectively in engineering projects
- The role and limitations of ICT, and an awareness of developing technologies in ICT
- Engineering principles, and the ability to apply them to analyse key engineering processes
- The capabilities of computer based models for solving problems in engineering, and the ability to assess the limitations of particular cases
- Design processes and methodologies and the ability to apply and adapt them in unfamiliar situations
- The commercial and economic context of engineering processes
- Management techniques which may be used to achieve engineering objectives within that context
- Management and business practices, and their limitations, and how these may be applied appropriately to strategic and tactical issues
- The requirement for engineering activities to promote sustainable development
- The framework of relevant legal requirements governing engineering activities, including personnel, health, safety and risk (incl. environmental risk) issues
- The need for a high level of professional and ethical conduct
- Characteristics of particular equipment, processes, or products
- Current practice and its limitations, and some appreciation of likely new developments
- Contexts in which engineering knowledge can be applied (e.g. operations and management, technology development, etc.)
- The use of technical literature and other information sources
- The nature of intellectual property and contractual issues

- Appropriate codes of practice and industry standards
- Quality issues

Intellectual Skills Ability to:

- Apply and integrate knowledge of and understanding of other engineering disciplines to support the study of mechanical and related engineering disciplines
- Use fundamental knowledge to investigate new and emerging technologies
- Identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques
- Extract data pertinent to an unfamiliar problem, and apply in its solution using computer based engineering tools when appropriate
- Apply quantitative methods and computer software relevant to mechanical and related engineering disciplines, to solve engineering problems
- Apply a systems approach to engineering problems
- Investigate and define a problem and identify constraints including environmental and sustainability limitations, health and safety and risk assessment issues
- Understand customer and user needs and the importance of such considerations as aesthetics
- Identify and manage cost drivers
- Use creativity to establish innovative solutions
- Generate an innovative design solution for a system, component or process to fulfil new needs
- Ensure fitness for purpose for all aspects of the problem including production, operation, maintenance and disposal
- Generate ideas for new products and develop and evaluate a range of new solutions
- Manage the design process and evaluate outcomes
- Make general evaluations of commercial risks through some understanding of the basis of such risks
- Ability to work with technical uncertainty
- Ability to apply engineering techniques taking account of a range of commercial and industrial constraints

Practical Skills Ability to:

- Complete basic engineering workshop and laboratory tasks
- Demonstrate practical knowledge and understanding of a wide range of common engineering materials and components

Professional Skills Ability to:

- Express concepts and ideas with articulacy, both orally and in writing, to lay and specialist audiences
- Engage in attentive exchange, with informed persuasive argument and reasoning
- Demonstrate teamwork and leadership skills
- Demonstrate an appreciation of cost and value
- Demonstrate an understanding of risk, uncertainty, failure and success
- Demonstrate networking and negotiating skills
- Be proficient at project and time management
- Show consideration for others in their workplace.

Entry Requirements	
Academic Requirement	Minimum A*AAA *or* A*A*A overall or equivalent to include A* in Mathematics and A*/A in Physics. Relevant subjects for the remaining A-level include: Biology, Chemistry, Computing, Design Technology, Economics, Electronics, Further Mathematics and Art and Design (4th A-Level only).
Non-academic Requirements	None
Home and EU students will be invited to attend an interview.	
English Language Requirement	IELTS 6.5 with a minimum of 6.0 in each element or equivalent
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=_540708_1	
Learning & Teaching Strategy	
Scheduled Learning & Teaching Methods	• Lectures • Problem sheets • Tutorials • Workshop training • Laboratory Work
E-learning & Blended Learning Methods	• Online teaching
Project and Placement Learning Methods	• Group practical exercises • Literature Research Project • Group Design project • Research Project
Assessment Strategy	
Assessment Methods	• Written Exams • Coursework
Academic Feedback Policy	
Where appropriate, feedback will be provided within 10 working days of submission of a piece 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: www.imperial.ac.uk/registry/exams/resit	

The pass mark for a Supplementary Qualifying Test is 50% unless taken under first-time rules.

Year One

If a candidate passes Thermofluids or Solid Mechanics on aggregate having failed either of the two constituent papers the Examining Board may, against criteria determined on a year by year basis, record a Deferred Decision and require a Supplementary Qualifying Test(s).

Year Two

If a candidate passes Thermofluids or Solid Mechanics or Design & Manufacture on aggregate having failed any of the constituent papers the Examining Board may, against criteria determined on a year by year basis, record a Deferred Decision and require a Supplementary Qualifying Test(s).

Mitigating Circumstances Policy

The College's Policy on Mitigating Circumstances is available at: www.imperial.ac.uk/registry/exams

Assessment Structure

Marking Scheme

Year One
A student must:

- Achieve an aggregate mark of at least 40% in each module;
- Achieve an aggregate mark of at least 40% in the Part I examination total;
- Achieve an aggregate mark of at least 40% in the combined coursework assessments.

If a candidate passes Thermofluids or Solid Mechanics on aggregate having failed either of the two constituent papers the Examining Board may, against criteria determined on a year by year basis, record a Deferred Decision and require a Supplementary Qualifying Test.

Year Two
A student must:

- Achieve an aggregate mark of at least 40% in each module;
- Achieve an aggregate mark of at least 40% in the Part II examination total;
- Achieve an aggregate mark of at least 40% in the combined coursework assessments.

A student who fails to achieve 50% on Part II Examination Total will be required to transfer to BEng degree registration. If a candidate passes Thermofluids or Solid Mechanics or D&M on aggregate having failed any of the constituent papers the Examining Board may, against criteria determined on a year by year basis, record a Deferred Decision and require a Supplementary Qualifying Test(s).

Year Three
A student must:

- Achieve an aggregate mark of at least 40% in the two core modules (Machine System Dynamics and Thermodynamics and Energy);
- Achieve an aggregate mark of at least 40% in the Part III examination total;
- Achieve a mark of at least 40% in the Design Make and Test Project;
- Achieve an aggregate mark of at least 40% in the combined coursework assessments.

An MEng student who achieves a Part III examination total of less than 50% while satisfying all other criteria for progression to Part IV will be invited to graduate with the award of a BEng Degree.

Year Four

A student must:

- Achieve a mark of at least 40% in the Individual Project;
- Achieve an aggregate exam mark of at least 40% in the Part IV examinations total.

In order for an MEng degree to satisfy the academic requirements for Corporate Membership of the Institution of Mechanical Engineers, marks for at least four Part IV courses (including the Advanced Applications course) must equal or exceed 40%

Final Degree Classifications

Third – a student must achieve an aggregate mark of 40%
Lower Second – a student must achieve an aggregate mark of 50%
Upper Second – a student must achieve an aggregate mark of 60%
First - a student must achieve an aggregate mark of 70%

Year	% Year Weighting	Element	Module	Mark Weighting	Total Marks
Year One	0%	Examination	Mathematics	140	630
			Thermodynamics 1	140	
			Fluid Mechanics 1		
			Mechanics 1	140	
			Stress Analysis 1		
			Materials	70	
			Mechatronics	70	
			Design and Manufacture	70	
		Coursework	Mathematics	4	170
			Thermodynamics 1	20	
			Fluid Mechanics 1		
			Mechanics 1	8	
			Stress Analysis 1		
			Materials	12	
			Mechatronics	18	
			Design and Manufacture	50	
			Computing	30	
			Experimental Reporting Skills	28	

Year	% Year Weighting	Element	Module	Mark Weighting	Total Marks
Year Two	25%	Examination	Mathematics	220	1210
			Fluid Mechanics 2	330	
			Heat Transfer		
			Thermodynamics 2		
			Dynamics	330	
			Materials 2		
			Stress Analysis 2		
			Mechatronics	110	
			Design and Manufacture 2	220	
			Management and Business for Engineers		
		Coursework	Mathematics	6	390
			Fluid Mechanics 2	48	
			Heat Transfer		
			Thermodynamics 2		
			Dynamics	62	
			Materials 2		
			Stress Analysis 2		
			Mechatronics	44	
			Computing	100	
			Design and Manufacture 2	100	
			Technical Presentation Skills	30	

Year	% Year Weighting	Element	Module	Mark Weighting	Total Marks
Year Three	37.5%	Examination	Machine System Dynamics	200	1400
			Thermodynamics and Energy	200	
			5 x modules from elective group (A), including no more than ONE Horizons elective (group (AH)) and THREE Design & Management electives (group (AD)). For the programme as a whole, no more than ONE Horizons elective (group (AH)) and THREE Design & Management electives (group (AD)) may be counted towards your final degree.	200 each	
		Coursework	Engineering Ethics/ Literature Research Project	200	1000
			Design, Make and Test Project	800	
Year Four	37.5%	Examination	1 x module from elective group (B)	400	1400
			5 x modules from elective groups (A) and (C), at least TWO of which must be from group (C). For the programme as a whole, no more than ONE Horizons elective (group (AH)), TWO IDX electives (group (CI)) and THREE Design & Management electives (group (AH)) may be counted towards your final degree.	200 each	
		Coursework	Individual Project	1000	1000

Indicative Module List												
Code	Title	Core/ Elective	Year	L&T Hours	Ind. Study Hours	Place-ment Hours	Total Hours	% Written Exam	% Course-work	% Practical	FHEQ Level	ECTS
ME1-HMTHA	Applied Mathematics	CORE	1	40	0	0	40	100%	0%	0%	4	0
ME1-HDMF	Design and Manufacture 1	CORE	1	64	61	0	125	0%	100%	0%	4	5
ME1-HFMX	Fluid Mechanics 1	CORE	1	45	80	0	125	100%	0%	0%	4	5
ME1-HMATL	Materials 1	CORE	1	44	81	0	125	100%	0%	0%	4	5
ME1-HMTH	Mathematics 1	CORE	1	129	171	0	300	100%	0%	0%	4	12
N/A	Mechanical Engineering Coursework 1	CORE	1	98	227	0	325	16.5%	75.3%	8.2%	4	13
ME1-HMCX	Mechanics 1	CORE	1	43	82	0	125	100%	0%	0%	4	5
ME1-HMTX	Mechatronics 1	CORE	1	59	66	0	125	100%	0%	0%	4	5
ME1-HSAN	Stress Analysis 1	CORE	1	43	82	0	125	100%	0%	0%	4	5
ME1-HTHD	Thermodynamics 1	CORE	1	45	80	0	125	100%	0%	0%	4	5
ME2-HDMF	Design and Manufacture 2	CORE	2	57	68	0	125	0%	100%	0%	5	5
ME2-HDYN	Dynamics	CORE	2	41	59	0	100	100%	0%	0%	5	5
ME2-HFMX	Fluid Mechanics 2	CORE	2	42	83	0	125	100%	0%	0%	5	5
ME2-HHTR	Heat Transfer	CORE	2	42	58	0	100	100%	0%	0%	5	5

Indicative Module List												
Code	Title	Core/ Elective	Year	L&T Hours	Ind. Study Hours	Place-ment Hours	Total Hours	% Written Exam	% Course-work	% Practical	FHEQ Level	ECTS
ME2-HMBE	Management and Business for Engineers	CORE	2	22	28	0	50	100%	0%	0%	5	2
ME2-HMATL	Materials 2	CORE	2	41	84	0	125	100%	0%	0%	5	5
ME2-HMTH	Mathematics 2	CORE	2	81	144	0	225	100%	0%	0%	5	9
N/A	Mechanical Engineering Coursework 2	CORE	2	26	249	0	275	18%	74%	8%	5	11
ME2-HMTX	Mechatronics 2	CORE	2	59	66	0	125	100%	0%	0%	5	5
ME2-HSAN	Stress Analysis 2	CORE	2	49	76	0	125	100%	0%	0%	5	5
ME2-HTHD	Thermodynamics 2	CORE	2	45	80	0	125	100%	0%	0%	5	5
ME3-MMSD	Machine System Dynamics	CORE	3	32	118	0	150	100%	0%	0%	6	6
N/A	Mechanical Engineering Coursework 3	CORE	3	10	440	0	450	0%	100%	0%	6	18
ME3-MTDE	Thermodynamics and Energy	CORE	3	32	118	0	150	85%	15%	0%	6	6
ME3-HCCM	Computational Continuum Mechanics	ELECTIVE (A)	3 / 4	27	123	0	150	100%	0%	0%	6	6
ME3-HDNVC	Design-led Innovation and New Venture Creation	ELECTIVE (AD)	3 / 4	31	119	0	150	0%	70%	30%	6	6
ME3-HECM	Embedded C for Microcontrollers	ELECTIVE (A)	3 / 4	30	120	0	150	0%	100%	0%	6	6
ME3-HFEAA	Finite Element Analysis and Applications	ELECTIVE (A)	3 / 4	24	126	0	150	100%	0%	0%	6	6

Indicative Module List												
Code	Title	Core/ Elective	Year	L&T Hours	Ind. Study Hours	Place-ment Hours	Total Hours	% Written Exam	% Course-work	% Practical	FHEQ Level	ECTS
ME3-HFMX	Fluid Mechanics 3	ELECTIVE (A)	3 / 4	32	118	0	150	100%	0%	0%	6	6
ME3-HFFM	Fundamentals of Fracture Mechanics	ELECTIVE (A)	3 / 4	31	119	0	150	100%	0%	0%	6	6
ME3-HNUCN	Introduction to Nuclear Energy	ELECTIVE (A)	3 / 4	30	120	0	150	100%	0%	0%	6	6
ME3-HMTM	Manufacturing Technology and Management	ELECTIVE (AD)	3 / 4	39	111	0	150	50%	25%	25%	6	6
ME3-HMTH	Mathematics 3	ELECTIVE (A)	3 / 4	32	118	0	150	100%	0%	0%	6	6
ME3-HSTAT	Statistics	ELECTIVE (A)	3 / 4	32	118	0	150	90%	10%	0%	6	6
ME3-HSAN	Stress Analysis 3	ELECTIVE (A)	3 / 4	32	118	0	150	100%	0%	0%	6	6
ME3-HSPAP	Structure, Properties and Applications of Polymers	ELECTIVE (A)	3 / 4	25	125	0	150	100%	0%	0%	6	6
ME3-HSDP	System Design and Optimisation	ELECTIVE (A)	3 / 4	30	120	0	150	65%	0%	35%	6	6
ME3-HTBM	Technology, Business and the Market	ELECTIVE (AD)	3 / 4	20	130	0	150	100%	0%	0%	6	6
ME3-HTRB	Tribology	ELECTIVE (A)	3 / 4	27	123	0	150	75%	25%	0%	6	6
N/A	Business for Professional Engineers and Scientists	ELECTIVE (AD)	3 / 4	Various			150	Various			6	6
N/A	Horizons	ELECTIVE (AH)	3 / 4	Various			150	Various			6	6

Indicative Module List												
Code	Title	Core/ Elective	Year	L&T Hours	Ind. Study Hours	Place-ment Hours	Total Hours	% Written Exam	% Course-work	% Practical	FHEQ Level	ECTS
ME4-MPRJ	Individual Project	CORE	4	20	380	0	400	0%	100%	0%	7	16
ME4-MAET	Aircraft Engine Technology	ELECTIVE (B)	4	42	258	0	300	50%	50%	0%	7	12
ME4-MMPT	Metal Processing Technology	ELECTIVE (B)	4	48	252	0	300	50%	50%	0%	7	12
ME4-MVPT	Vehicle Propulsion Technology	ELECTIVE (B)	4	42	258	0	300	50%	50%	0%	7	12
ME4-MMCTR	Mechanical Transmissions	ELECTIVE (B)	4	42	258	0	300	50%	50%	0%	7	12
ME4-MCNTL	Advanced Control	ELECTIVE (C)	4	26	149	0	175	100%	0%	0%	7	7
ME4-MASA	Advanced Stress Analysis	ELECTIVE (C)	4	33	142	0	175	100%	0%	0%	7	7
ME4-MAVE	Advanced Vibration Engineering	ELECTIVE (C)	4	22	153	0	175	60%	30%	10%	7	7
ME4-MCMB	Combustion	ELECTIVE (C)	4	21	154	0	175	100%	0%	0%	7	7
ME4-MCFD	Computational Fluid Dynamics	ELECTIVE (C)	4	25	150	0	175	25%	75%	0%	7	7
ME4-MFEAA	Finite Element Analysis and Applications	ELECTIVE (C)	4	24	151	0	175	80%	20%	0%	7	7
ME4-MNDP	Interfacing and Data Processing	ELECTIVE (C)	4	32	143	0	175	60%	40%	0%	7	7
ME4-MNURP	Nuclear Reactor Physics	ELECTIVE (C)	4	32	143	0	175	100%	0%	0%	7	7
ME4-MNUTH	Nuclear Thermal Hydraulics	ELECTIVE (C)	4	32	143	0	175	100%	0%	0%	7	7

Indicative Module List												
Code	Title	Core/ Elective	Year	L&T Hours	Ind. Study Hours	Place-ment Hours	Total Hours	% Written Exam	% Course-work	% Practical	FHEQ Level	ECTS
N/A	IDX	ELECTIVE (CI)	4	Various			175	Various			7	7

Supporting Information
The Programme Handbook is available at: http://www.imperial.ac.uk/engineering/departments/aeronautics/study/ug/courses/
The Module Handbook is available at: http://www.imperial.ac.uk/engineering/departments/aeronautics/study/ug/courses/
The College's entry requirements for undergraduate programmes can be found at: www.imperial.ac.uk/study/ug/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: http://www3.imperial.ac.uk/registry/proceduresandregulations/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". http://www.imperial.ac.uk/admin-services/secretariat/college-governance/charters-statutes-ordinances-and-regulations/
Imperial College London is regulated by the Higher Education Funding Council for England (HEFCE) http://www.hefce.ac.uk/reg/of/