

MRes Medical Device Design and Entrepreneurship

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

Programme Title	Medical Device Design and Entrepreneurship		
Award(s)	MRes		
Programme Code	H673U		
Awarding Institution	Imperial College London		
Teaching Institution	Imperial College London		
Faculty	Faculty of Engineering		
Department	Department of Bioengineering		
Associateship	City and Guilds of London Institute		
Main Location of Study	South Kensington and White City Campuses		
Mode and Period of Study	1 calendar year, full-time		
Cohort Entry Points	Annually in October		
Relevant QAA Benchmark Statement(s) and/or other external reference points	Master's Degree in Engineering Master's Degree in Biosciences		
Total Credits	ECTS:	90	CATS: 180
FHEQ Level	Level 7		
EHEA Level	2 nd cycle		
External Accrator(s)	None		
Specification Details			
Student cohorts covered by specification	2019/20 entry		
Person responsible for the specification	Professor Martyn Boutelle, Director of Courses		
Date of introduction of programme	2013		
Date of programme specification/revision	July 2018		

Programme Overview

This programme is offered as a one-year full-time programme consisting of a number of elements leading to the MRes degree – these include lectures, practicals and a major research project focussed on a medical device concept.

In the first term, students will begin the programme with compulsory core modules and practical work.

In the first term students also make their choice on the medical device concept which will be the subject of their research/development project, and begin working on a market analysis and development plan. The research project would usually be supervised by Professor Moore and there would usually be a second supervisor from industry. Industry participation enhances the quality of the educational experience by providing additional input on the complex pathway encountered in pushing a medical device toward the marketplace. Industry participants have a technical background and are currently working in medical device development or business funding.

During term 2 and 3 students study some other taught modules and attend workshops. Throughout the year, students also attend Departmental seminars throughout the year, as well as the Department of Bioengineering PhD Assessment days, which are structured as mini-symposia.

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:

1. Core and specialised concepts in bioengineering entrepreneurship;
2. Business strategy planning expertise specific to medical device development;
3. Detailed knowledge and understanding of the essential facts, concepts, principles and theories relevant to the medical device that is the subject of their research/development project;
4. Management and communication skills, including problem definition, project design, decision processes, teamwork, written and oral reports, proposals and publications.

Intellectual Skills:

1. Analyse and solve problems in bioengineering using an integrated multidisciplinary approach;
2. Integrate and evaluate information;
3. Formulate an engineering-based development path for a medical device;
4. Plan, conduct, present and write-up a business plan for a medical device.

Practical Skills:

1. Use engineering analysis tools to evaluate the feasibility and likely success of a medical device concept;
2. Use laboratory methods or computer-based tools to generate data;
3. Analyse results, determine their strength and validity, and make recommendations;
4. Prepare technical and business reports;
5. Give technical and business presentations;

6. Use the literature effectively.

Professional Skills Development:

1. Communicate effectively across different scientific and business disciplines through oral presentations and written reports;
2. Apply knowledge, experimental, and modelling skills;
3. Management skills: decision processes, objective criteria, problem definition, project design and evaluation needs;
4. Integrate and evaluate information from a variety of sources;
5. Transfer techniques and solutions from one discipline to another;
6. Use Information and Communications Technology;
7. Manage resources and time;
8. Learn independently with open-mindedness and critical enquiry;
9. Learn effectively for the purpose of continuing professional development.

Entry Requirements

Academic Requirement	The minimum requirement is normally an upper second class (2:1) UK Bachelor's Degree with Honours in a Physical, Engineering, Mathematical, or Life/Biomedical Sciences-based subject from an UK academic institution or a comparable qualification recognised by the College
Non-academic Requirements	None
Applicants may be invited to attend an interview with one or more members of academic staff.	
English Language Requirement	<u>Standard requirement</u> IELTS score of 6.5 overall (minimum 6.0 in all elements)
The programme's competency standards document can be found at: <u>http://www.imperial.ac.uk/bioengineering/admin/msc/essential-information/</u>	

Learning & Teaching Strategy

Scheduled Learning & Teaching Methods	<ul style="list-style-type: none"> • Demonstrations • Group exercises • Guided practical classes • Laboratory work • Lectures • Individual research project • Presentations • Seminars • Workshops
E-learning & Blended Learning Methods	<ul style="list-style-type: none"> • Virtual Learning Environment: Blackboard • Online groups/discussions

	<ul style="list-style-type: none"> • Online quizzes and interactive content • You tube videos • Anonymous feedback • Lectures recorded using Panopto
Project and Placement Learning Methods	<ul style="list-style-type: none"> • Group and individual project work
Assessment Strategy	
Assessment Methods	<ul style="list-style-type: none"> • Written examinations • Oral presentations • Coursework including multiple choice progression test, problem sheets and quizzes • Written reports, including a research thesis
Academic Feedback Policy	
<p>Feedback may be provided in one of a number of formats, including:</p> <ul style="list-style-type: none"> • Oral (during or after lectures) • Personal (discussion with academics during office hours) • Interactive (problem solving tutorials with GTAs & study groups) • Written (solutions/model answers to coursework) <p>Individual feedback will not be provided on written examinations.</p> <p>Numerical results will be published after the meeting of the final Board of Examiners.</p>	
Re-sit Policy	
<p>Eligibility for resits is determined by the Examination Board in line with the College policy. The Department of Bioengineering does not normally offer resits in September. Students with marginal failure may be offered a supplementary qualifying test in place of a re-sit opportunity. The College's Policy on Re-sits is available at: www.imperial.ac.uk/registry/exams/resit</p>	
Mitigating Circumstances Policy	
<p>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/</p>	
Assessment Structure	
Marking Scheme	

The Pass Mark for all postgraduate taught course modules is 50%. Students must pass all elements in order to be awarded a degree.

1. Minimum standards (i.e. 50%) in each of the three assessed elements (coursework, written research/development project and presentations) will be required with an overall pass mark of 50%. To achieve pass with distinction a minimum of 70% is required in each of the elements. To achieve pass with merit a minimum of 60% is required in each of the elements.
2. To qualify for the award of MRes, students must complete all the course requirements, including the participation in mandatory extra curriculum events, and must achieve an overall pass mark in the combined examinations.
3. Students will be given a mark for both assessed element, plus an overall mark which is used to decide whether a Merit or Distinction is awarded. For this overall mark, the weighting of the individual marks is 22% for the taught element (Medical Device Entrepreneurship module 11% and Computational and Statistical Methods for Research 11%; , and 78% for the research/development project element (10% for the marketing analysis and development path, 10% for the elevator pitch, 45% for the written research/development project and 10% for the oral viva). The two independent viva examiners provide internal marks for the oral exam (about 45min) and the research report. Both viva examiners will finally provide an agreed mark. The final mark for the research project, conduct, and viva is the average of the marks from the supervisors and the agreed mark from the viva examiners. The external examiners will moderate the final mark if necessary.

The Pass Mark for all postgraduate taught course modules is 50%. Students must pass all elements in order to be awarded a degree. If any module score is less than 50% it must be compensated by other modules in the same element. However if any module score is less than 40% it is deemed to be failed and the Board of Examiners at their discretion will decide whether the student can be deemed to have passed the MRes overall.

Module Weightings		
Element	Module	% Module Weighting (in element)
Taught Element (22%)	Medical Device Entrepreneurship	50%
	Computational and Statistical Methods for Research	50%
	Topics in Biomedical Engineering and Business	0%
Research Element (78%)	Marketing analysis and development	13%
	Elevator pitch	13%
	Written research / development project	61%
	Oral viva	13%

Indicative Module List											
Code	Title	Core/ Elective	L&T Hours	Ind. Study Hours	Place- ment Hours	Total Hours	% Writte n Exam	% Course- work	% Practica l	FHE Q Level	ECTS
BE9-MDEVEN	Medical Device Entrepreneurship	CORE	27	157.5	0	187.5	0%	100%	0%	7	7.5
BE9-MSTDA	Computational and Statistical Methods for Research	CORE	27	98	0	125	100%	0%	0%	7	5
BE9-MRNCM	Topics in Biomedical Engineering and Business	CORE	108	79.5	0	187.5	0%	100%	0%	7	7.5
	Research Project	CORE	41	1634	0	1675	0%	73%	27%	7	70

Supporting Information

The Programme Handbook is available at:

<http://www.imperial.ac.uk/bioengineering/study/postgraduate-research/mrs-med-device-design/>

The Module Handbook is available at: <http://www.imperial.ac.uk/bioengineering/admin/current-pgt/options/b9a1/>

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:

<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/charter-and-statutes/>

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