

MRes Medical Robotics and Image Guided Intervention

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 Robotics and Image Guided Intervention			
Award(s)	MRes			
Programme Code	A1H6T			
Associateship	N/A			
Awarding Institution	Imperial College London			
Teaching Institution	Imperial College London			
Faculty	Faculty of Medicine (lead)			
	Faculty of Engineering			
Department	Department of Surgery and Cancer			
	Hamlyn Centre for Medical Robotics, Institute of Global Health Innovation			
	Department of Computing			
Mode and Period of Study	1 academic year, full-time			
Cohort Entry Points	Annually in October			
Relevant QAA Benchmark Statement(s) and/or other external reference points	N/A			
Total Credits	ECTS:	90	CATS:	180
FHEQ Level	Level 7			
EHEA Level	2 nd cycle			
External Accreditor(s)				
Specification Details				
Student cohorts covered by specification	2016-17 entry			

Person responsible for the specification	Daniel Elson
Date of introduction of programme	October 2011
Date of programme specification/revision	June 2016
Description of Programme Contents	
<p>This course will provide you with the research experience required to work within the highly innovative field of medical robotics and surgical technology.</p> <p>Medical Robotics and Image-Guided Intervention are two technology-driven areas of medicine that have experienced tremendous growth and improvement over the last twenty years, partly driven by the surgical aim of progressively less invasive and harmful treatments.</p> <p>This is a multidisciplinary field and is led by three internationally-known departments:</p> <ul style="list-style-type: none"> • the Hamlyn Centre for Medical Robotics (part of the Institute of Global Health Innovation) • the Department of Surgery and Cancer • the Department of Computing <p>All teaching and research will take place in the facilities of the Hamlyn Centre.</p> <p>Taught modules include a mixture of engineering and medical topics such as medical robotics and instrumentation, minimally invasive surgery, surgical imaging and optics, image guided intervention, sensing, perception and neuroergonomics.</p> <p>You will spend eight months working on a cutting-edge research project.</p>	
Learning Outcomes	
<p>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</p>	
<p>Knowledge and Understanding of:</p> <ul style="list-style-type: none"> • The principles and workings of medical robotics, imaging techniques and surgical technology in use in surgery • The main methods, interventions and applications in current surgical practice, including a knowledge of the anatomy concerned; • Device design and research methods, including data acquisition, testing, study design, statistics, clinical outcomes and interpretation; • Minimally invasive and optical endoscopic techniques and new applications; • Image-guided intervention techniques; • Safety issues and ergonomic considerations in robotic and endoscopic equipment design; • Detailed knowledge and understanding of the essential facts, concepts, principles and theories relevant to the particular project chosen; • How to write scientific papers, give research presentations, present research to the wider community, and ability to manage research projects. 	

Intellectual Skills

- Analyse and solve problems related to the implementation of new technology in surgery:
 - using engineering, computational, numerical and analytical tools
 - using an integrated multidisciplinary approach
 - applying professional judgements to balance costs, benefits, safety and social and environmental impact;
- Integrate and evaluate information;
- Formulate and test hypotheses using appropriate experimental design and statistical analysis of data;
- Plan, conduct and write-up a programme of original research.

Practical Skills:

- Design, plan and execute experiments;
- Acquire data in the laboratory or clinic using computational acquisition methods where appropriate;
- Analyse experimental results and determine their strength and validity;
- Prepare reports;
- Give presentations;
- Use the scientific literature effectively;
- Use computational tools and packages.

Transferable Skills:

- Communicate effectively through oral presentations, computer processing and presentations, written reports and scientific publications;
- Apply statistical and modelling skills;
- Management skills: decision processes, objective criteria, problem definition, project design and evaluation, risk management, teamwork and coordination;
- Integrate and evaluate information from a variety of sources;
- Transfer techniques and solutions from one discipline to another;
- Use Information and Communications Technology;
- Manage resources and time;
- Learn independently with open-mindedness and critical enquiry;
- Learn effectively for the purpose of continuing professional development.

Entry Requirements

Academic Requirement	2.1 Honours degree in a science or engineering based subject. Applicants with a lower degree qualification but at least three years' work experience may be considered.
Non-academic Requirements	None
English Language Requirement	IELTS 6.5 with a minimum of 6.0 in each element or equivalent.

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

<http://www.imperial.ac.uk/students/academic-support/graduate-attributes/>

Learning & Teaching Strategy	
Scheduled Learning & Teaching Methods	<ul style="list-style-type: none"> • a combination of lectures, tutorials, and group research skills project. • the individual, supervised research project and the supplementary lectures given on these topics • students are encouraged to undertake independent reading both to supplement and consolidate what is being taught/learned and to broaden their individual knowledge and understanding of the subject • Intellectual skills, experimental design and statistical skills are developed through the lectures, use of group research skills project and individual project
E-learning & Blended Learning Methods	<ul style="list-style-type: none"> • Professional skills are developed through the lectures, use of group research skills project and individual project.
Project and Placement Learning Methods	<p>Students will be provided with opportunities to develop the following skills via the research project, which will involve supervision from a lead academic as well as interaction with a wider research group:</p> <ul style="list-style-type: none"> • design, plan and execute experiments; • acquire data in the laboratory or clinic using computational acquisition methods where appropriate; • analyse experimental results and determine their strength and validity; • prepare reports; • give presentations; • use the scientific literature effectively; • use computational tools and packages.
Assessment Strategy	
Assessment Methods	<p>Assessment of the knowledge base is through a combination of unseen written examinations, an essay, and the individual research project report with an oral presentation.</p>
Academic Feedback Policy	
<p>Feedback on assessed work will be provided within three weeks of the assessment. Informal feedback on progress in the lecture modules will be provided via the classroom sessions, where students will have an opportunity to discuss their work with the module leader and classroom assistants. Project progress will be monitored through regular meetings with the project supervisory team, where feedback will be provided.</p>	

Student feedback will be obtained via student representatives on the staff-student committee which meets once per term and meetings are minuted. This committee will consist of the course director, one other member of academic staff (preferably one of the programme chairs) and two elected student representatives. Questionnaires will be provided for each course and students will receive a commentary on their responses. Course organisers and staff will also meet with students on a weekly basis and request feedback from students both as a class and individually. Course organisers are always available to meet with students on a one to one basis to discuss areas of individual concern.

Students will receive formative and summative feedback via the examinations and project work as well as class discussions during the classworks.

External examiners will request feedback from students after the final viva and report these views in the external examiners report. Each student will also anonymously complete a feedback questionnaire at the end of the year. The process will be run within the standard e-learning environment (Blackboard) and results will be collated and made available to the Course Organisers to inform changes to the next year of the course. Students will be informed of the actions taken as a result of feedback at weekly core sessions and via email as appropriate.

Re-sit Policy

The College's Policy on Re-sits is available at: www.imperial.ac.uk/registry/exams/resit

Mitigating Circumstances Policy

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

Assessment Structure

Marking Scheme

In order to achieve the award of MRes, a student must:

- Achieve a mark of at least 50% in each individual core course examination
- Achieve an aggregate examination mark of at least 50%
- Achieve an aggregate mark of at least 50% in the combined coursework assessments

Final Degree Classifications

Pass:

The Pass Mark for postgraduate taught courses is 50%.

Merit:

In order to be awarded a result of merit, a candidate must obtain an aggregate mark of 60% or greater. Where appropriate, a Board of Examiners may award a result of merit where a candidate has achieved an aggregate mark of 60% or greater across the programme as a whole AND has obtained a mark of 60% or greater in each element with the exception of one element AND has obtained a mark of 50% or greater in this latter element.

Distinction:

A result of distinction requires an aggregate mark of 70% or greater. Where appropriate, a Board of Examiners may award a result of distinction where a candidate has achieved an aggregate mark of 70% or greater across the programme as a whole AND has obtained a mark of 70% or greater in each element with the exception of one element AND has obtained a mark of 60% or greater in this latter element.

Module Weightings	
Module	% Module Weighting
Medical Robotics and Instrumentation	5%
Minimally Invasive Surgery	5%
Surgical Imaging and Optics	5%
Image Guided Intervention	5%
Perception and Ergonomics	5%
Group Research Skills Project	5%
Individual Project	70%

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
	Medical Robotics and Instrumentation	CORE	24	76	0	100	100%	0%	0%	7	4
	Minimally Invasive Surgery	CORE	24	76	0	100	0%	100%	0%	7	4
	Surgical Imaging and Optics	CORE	24	76	0	100	100%	0%	0%	7	4
	Image Guided Intervention	CORE	24	76	0	100	100%	0%	0%	7	4
	Perception and Ergonomics	CORE	24	76	0	100	100%	0%	0%	7	4
	Group Research Skills Project	CORE	100	0	0	100	0%	0%	100%	7	4
	Individual Project	CORE	37	1613	0	1650	25%	56%	19%	7	66

Supporting Information

The Programme Handbook is available at:

<http://www.imperial.ac.uk/medicine/study/postgraduate/masters-programmes/mres-medical-robotics-and-image-guided-intervention/>

The Module Handbook is available at:

<http://www.imperial.ac.uk/medicine/study/postgraduate/masters-programmes/mres-medical-robotics-and-image-guided-intervention/>

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://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/>