DEPARTMENT OF NATIONAL HEART & LUNG INSTITUTE

Faculty of Medicine

MSc in Medical Ultrasound &
MSc in Medical Ultrasound (Echo)

STUDENT HANDBOOK
2016–17
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Welcome to the College

Congratulations on joining Imperial College London, the only university in the UK to focus exclusively on science, medicine, engineering and business.

From Fleming’s discovery of Penicillin to Gabor’s invention of holography, Imperial has been changing the world for well over 100 years. You’re now part of this prestigious community of discovery and we hope you will take this opportunity to make your own unique contribution.

We’re committed to providing you with the very best academic resources to enrich your experience. We also provide a dedicated support network and a range of specialist support services to make sure you have access to the appropriate help, whether that’s further training in an academic skill like note taking or simply having someone to talk to.

You’ll have access to an innovative range of professional development courses within our Graduate School throughout your time here, as well as opportunities to meet students from across the College at academic and social events – see page 6 for more information.

We actively encourage you to seek out help when you need it and try to maintain a healthy work-life balance. Our choice of over 340 clubs, societies and projects is one of the largest of any UK university, making it easy to do something different with your downtime. You also have free access to gym (following a one-off orientation fee of £40 in 2016) and swimming facilities across our campuses.

As one of the best universities in the world, we are committed to inspiring the next generation of scientists, engineers, clinicians and business leaders by continuing to share the wonder of what we do through public engagement events. Postgraduate students, alongside our academics and undergraduate students, make a significant contribution to events such as our annual Imperial Festival and our term-time Imperial Fringe events – if you’re interested in getting involved then there will be opportunities for you to do so.
Welcome
Professor Sue Gibson,
Director of the Graduate School

The Graduate School has several roles but our main functions are to provide a broad, effective and innovative range of professional skills development courses and to facilitate interdisciplinary interactions by providing opportunities for students to meet at academic and social events. Whether you wish to pursue a career in academia, industry or something else, professional skills development training will improve your personal impact and will help you to become a productive and successful researcher.

Professional skills courses for Master’s students are called “Masterclasses” and they cover a range of themes, for example, presentation skills, academic writing and leadership skills (see page 6 for more information).

All Masterclasses are free of charge to Imperial Master’s students and I would encourage you to take as many as you can to supplement your academic training. The Graduate School works closely with the Graduate Students’ Union (GSU) and is keen to respond to student needs, so if there is an area of skills training or an activity that you would like us to offer, but which is not currently provided, please do get in touch (see page 6).

The Graduate School also runs a number of exciting social events throughout the year which are an opportunity to broaden your knowledge as well as to meet other students and have fun. Particular highlights include the Ig Nobel Awards Tour Show, the Chemistry Show and the 3-minute thesis competition. You should regularly check the Graduate School’s website and e-newsletters to keep up to date with all the events and training courses available to you.

Finally, I hope that you enjoy your studies here at Imperial, and I wish you well.

Welcome
Dr Janet De Wilde,
Head of Postgraduate Professional Development

I would like to welcome you to the Graduate School programme for postgraduate professional development. Our team of tutors come from a wide variety of experiences and we understand just how important it is to develop professional skills whilst undertaking postgraduate studies and research. Not only will this development improve your success during your time at Imperial, it will also prepare you for your future careers. We are continually working to develop the courses we offer and over this year you will see a range of new courses including face-to-face workshops, interactive webinars and online self-paced courses. I encourage you to explore and engage with the diverse range of opportunities on offer from the graduate school and I wish you well in your studies.
The Graduate School

You automatically become a member of the Graduate School when you register as a postgraduate student at Imperial.

The Graduate School has been set up to support all postgraduate students at the College through:

- Training and development courses
- Networking activities, social and academic events to encourage cross-disciplinary interactions
- Forums to represent the views of postgraduate students throughout the College

‘Masterclass’ professional skills courses

You can see the full range of free professional skills courses for postgraduate students on the Graduate School website:

www.imperial.ac.uk/study/pg/graduate-school/professional-skills/masters

All courses can be booked online.

Contact us

Level 3, Sherfield Building, South Kensington Campus
020 7594 1383
graduate.school@imperial.ac.uk
www.imperial.ac.uk/graduate-school

Imperial Success Guide

The Imperial Success Guide is an online resource with advice and tips on the transition to Master’s level study. More than just a study guide, it is packed with advice created especially for Imperial Master’s students, including information on support, health and well-being and ideas to help you make the most of London.

www.imperial.ac.uk/success-guide
Introduction from the President of Imperial College Union

Insert text here from this webpage

Introduction from the President of the Graduate Students’ Union

I am delighted to welcome you to Imperial, and to the Graduate Students’ Union (GSU). I hope that your time here will be fulfilling and valuable, and the GSU is here to try and facilitate this.

Imperial College London is such a wonderful and transformative place that provides a unique and thrilling environment for research and for advanced studies, and the graduate students are a vital and valued part of the wider community of Imperial. Our graduate students are at the forefront of the research done. Therefore, at the GSU we ensure that the experience here fosters both academic achievement and personal development in our students.

The GSU is a University-wide representative body for postgraduate students at Imperial. It promotes the interests and welfare of its members, provides social and recreational activities and advocate for you and your opinions to the University and bodies external to the university. I encourage you to become an active member of the GSU—through involvement in your departments and the many University societies, and through our representational and campaigning activities.

I wish you all a fantastic time here at Imperial. Please take advantage of our rich community, and hope to meet you all soon.

Ahmed Shamso

gsu.president@imperial.ac.uk
1. Introduction to the Department

Welcome from Programme Directors

Prof Petros Nihoyannopoulos

Dr Mo Aslam
**Academic Staff**

<table>
<thead>
<tr>
<th>Abigail Thrush</th>
<th>Physics Tutor</th>
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**Administrative staff**

<table>
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<tr>
<th>Tony Steedman</th>
<th>Administrator</th>
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<tr>
<td>W12 Conferences</td>
<td>020 3313 1606</td>
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<tr>
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<td>Contact via Blackboard Mail</td>
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**English language requirement**
If you are not a native English speaker you must meet the College's English language requirements.

See the Admissions website for details:

[www.imperial.ac.uk/study/pg/apply/requirements/english](http://www.imperial.ac.uk/study/pg/apply/requirements/english)

For information on English language support available while you’re here, see page 28.

**Attendance and absence**
You must inform your Postgraduate Tutor if you are absent from the College for more than three days during term. If the absence is due to illness you must produce a medical certificate after seven days. If you miss an examination through illness you must produce a medical certificate immediately.

The Registry will be informed of all student non-attendances as the College is obliged to report the non-attendance of students on Tier 4 visas to the Home Office.

Attendance is monitored daily within your clinical department.

**Key dates 2016–17**
Please see the important deadline dates on our blackboard pages.

**Term dates**
- Autumn term: 1 October–16 December 2016
- Spring term: 7 January–7 April 2017
- Summer term: 24 April–30 September 2017

**Closure dates**
- Christmas/New year: 25 December 2016–3 January 2017
- Easter holiday: 10 April – 21 April 2017
- Early May bank holiday: 1 May 2017
- Spring bank holiday: 29 May 2017
- Summer bank holiday: 28 August 2017

**Key events**
- Postgraduate Awards Ceremonies: May 2017
- Imperial Festival and Alumni Festival: 6–7 May 2017
2. Programme information

Course overview
The first trimester is a Core module on statistics and basic physics, at the end of this module the student should have a good understanding of the basic physics of medical ultrasound including medical statistics. The student should also have gained basic experience in all the major ultrasound techniques and understood their application in routine ultrasound laboratories.

At the same time during the first trimester, the students should have agreed on their research project with their respective supervisors, have formulated the basic hypothesis of the project and drafted the methodology. An ethics application should be submitted when applicable by the end of this trimester. Ethics applications can take a long time to process so it’s important that you submit this as soon as possible.

During the second trimester (Feb-April) students will be separated in to their chosen sub-specialties. Those are Echocardiography and Vascular Ultrasound. They will receive a number of lectures to cover the sub-specialty Core Curriculum upon which they will be examined on basic knowledge.

During the second trimester, the students will also have regular scanning sessions in the respective laboratories under supervision. By the end of this trimester, the students should have performed half of their expected examinations for their logbook. At the end of this trimester the students will undergo a mock examination on knowledge of physics and sub-specialty

During the third trimester, the students will complete the lectures and concentrate on the research project. The final examination on all subjects will be organised in May/June.

The last trimester will be focused on finalising the research project, which will have to be submitted in August. In the meantime the students will need to complete their logbook.

The research project is to be carried out concomitantly over a period of approximately 9 months and will be carried out in departments at the various campuses of Imperial College London, subject to approval by all concerned. Each student will select, or be assigned, a research project with their respective supervisors. The projects will be selected such that a student can reasonably be expected to make an original contribution to the chosen area of research within the time period allotted. The purpose of the project is to provide the student with training in academic research and acquisition of practical skills, including the design of a research project, planning of experiments, dealing with practical problems, recording of, presenting and analysing data. Time will be allocated towards the end of the project period to write a thesis on the research work.

Click on the links below to access:

- Programme specification
- Timetable
- Reading list
Physics

MSc Core Module – Ultrasound Science and Equipment

Physics Module leader Abigail Thrush (you can contact Abigail through blackboard mail)

Learning Outcomes
On completion of this module the students will be able to:

• Discuss the scientific principles of ultrasound wave propagation and interaction with tissue including attenuation, reflection and scattering, non-linear propagation and its use in harmonic imaging
• Understand the construction and operation of multi element array ultrasound transducers
• Discuss the scientific principles of pulse echo ultrasound and ultrasound image formation including factors that affect frame rate and image resolution
• Discuss the scientific principles of the Doppler effect and the principles behind continuous wave Doppler, pulsed wave Doppler, Colour flow imaging and spectral Doppler display
• Demonstrate the ability to optimise B-mode imaging, colour flow imaging, and spectral Doppler display controls in order to maximise the quality of the ultrasound investigation.
• Understand, recognise and minimise imaging and Doppler artefacts
• Discuss the safe use of ultrasound including knowledge of bioeffects and the purpose of MI/TI.
• Discuss QA of ultrasound equipment
• Demonstrate a scientific understanding of new technologies e.g. 3 and 4D, contrast imaging
• Recognise the limitations of ultrasound

MSc in MEDICAL ULTRASOUND: Ultrasound Science and Equipment


• longitudinal and transverse waves, Frequency, wavelength.
• Speed of sound values for tissue.
• Pressure, intensities, amplitude and power, decibel scale.
• Absorption and Attenuation, attenuation coefficient values for tissues.
• Scattering, Specular and diffuse reflection.
• Characteristic acoustic impedance.
• Transmission through layers, refraction.
• Constrictive and destructive interference, ultrasound beams – grating and side lobes
2. Pulse Echo techniques and image formation

- Principles of B-mode and M-mode imaging, B-mode image controls – e.g. Gain, TCG, Power, depth, dynamic range and compression.
- Speed of sound limitations on imaging (PRF) - Frame rate and factors that affect it- e.g. scan line density.
- B-mode beam shape controls e.g. focusing, Image resolution.

3. Transducers


4. Beam forming

- Beam formation using multi-element transducers, Focusing on transmit focusing on receive, affect if focusing on frame rate, beam steering for Doppler beam formation and phased array transducers, spatial compound imaging.

5. Images storage

- Analogue to digital conversion, scan converter, post processing controls, printers, PACS

6. Doppler Ultrasound

- Doppler Effect, CW & PW Doppler, spectral Doppler display,
- Colour Flow imaging, Power Doppler imaging, Tissue Doppler imaging, optimisation of Doppler controls, factors that affect Spectral Doppler display and colour Flow imaging including aliasing

7. Artefacts and measurement errors

- Physical causes of artefacts in B mode and Doppler ultrasound
- sources of error in ultrasound measurements

8. Bio-effects and Safety

- Bio-effects –thermal and mechanical, measurements of Acoustic power, Ispta, Isppa, Isata, MI and TI indices
- BMUS and WUFUM guidelines

9. Quality assurance

- Purpose of QA
- Test object properties,
- B-mode imaging QA
- Doppler QA
10. Tissue harmonic imaging and Contrast agents

- Non-linear propagation
- tissue harmonic imaging – advantages and limitations.
- Contrast agents - Design criteria, acoustic properties, detection strategies.
- Quantification techniques.

11. New techniques

- 3&4 D imaging
- HIFU
Echocardiography

MSc in MEDICAL ULTRASOUND: Subspecialty Echocardiography
Module leader: Professor Petros Nihoyannopoulos, MD, FRCP (petros@imperial.ac.uk)

1. BASIC SYLLABUS TOPICS

1.1.1 Propagation of ultrasound through tissues
- Speed of sound in varying tissues.
- Principles related to reflection.
- Principles related to refraction.
- Principles related to attenuation.
- Useful diagnostic frequency range.

1.1.2 Ultrasound transducers
- Piezo-electric effect, transducer construction and characteristics,
- sound beam formation.
- Focusing methods.

1.1.3 Echo instruments
- Pulse repetition frequency.
- Frequency, output power control, overall gain,
- Time gain compensation, reject, compression, signal processing, dynamic range, pre-processing.

1.1.4 Principles of Imaging
- A mode, B-mode and M-mode methods.
- Scanning speed limitations, relationships between
- Pulse repetition frequency, frame rate, lines per frame, field of view, and depth to be imaged.
- Effect on evaluation of rapid motion, temporal resolution.

1.1.5 Storage and Display of images
- Scan convertors and digital memories.
- Basic concept of digital systems.
- Display devices and controls, post processing, recording techniques.

1.1.6 Basic Principles of Doppler
- The Doppler effect as applied to interaction of ultrasound waves with moving blood
- Measurement of flow velocity with CW Doppler, including Bernoulli equation
• Concept of deriving pressure gradients from peak velocities
• Limitation of CW Doppler caused by lack of depth discrimination
• Principle of Pulsed Doppler: concept of limitation by aliasing
• Concept of colour flow imaging as multi-sampled PW

1.1.7 Doppler instrumentation

• The Doppler 'pencil probe'
• 'Simultaneous' Doppler using imaging transducers
• Features of the spectral display: positive & negative velocities; scale & baseline controls;
• Representation of signal strength by image intensity
• How aliasing manifests on the spectral display
• Features of the colour display: BART terminology
• How aliasing and turbulence manifest on the colour display

1.2 Cardiac Anatomy and Physiology

1.2.1 Anatomy of the thorax

• Thorax contained by rib cage & diaphragm
• Lungs & pleura; heart & pericardium; mediastinum
• Blood vessels within the thorax

1.2.2 Gross anatomy of the heart

• Nomenclature of chambers and valves
• Major relationships of chambers, valves and blood vessels
• Distinguishing features of valves and chambers as related to echocardiography
• The pericardial sac

1.2.3 Cardiac anatomy as demonstrated by echocardiography

• Anatomic features of long axis, short axis and 4-chamber imaging planes

1.2.4 The Cardiac Cycle

• Temporal relationships of the ECG, chamber pressures and valve movements
• Typical values for intracardiac pressures
• Relationship of valve movements to heart sounds

1.3 Basic aetiology and pathophysiology of heart disease and medical/surgical treatment as relevant to echocardiography.

1.3.1 Anatomic and physiological basis of cardiac pathology

• Simple congenital defects (ASD, VSD, PDA)
• Valve stenosis and regurgitation
• Chamber hypertrophy and enlargement: pressure and volume overload
• Global & regional myocardial dysfunction
• Pericardial fluid
1.3.2 Aetiology, presentation, signs of acquired valvular disease

- Rheumatic disease
- Degenerative mitral valve disease
- Aortic stenosis Infective endocarditis

1.3.3 Aetiology, presentation, signs of heart failure

- Left heart failure
- Right heart failure

1.3.4 Aetiology, presentation and signs of ischaemic heart disease

- Stable angina
- Unstable angina /acute infarction
- Post-infarction complications: tamponade; VSD; aneurysm

2. ADULT ECHOCARDIOGRAPHY

2.1 Advanced cardiac anatomy

- Detailed structural anatomy of the heart, great vessels and pericardium
- Visualisation of normal cardiac anatomy and normal variants in standard echocardiographic planes

2.2 Cardiac functional parameters

- Methods for on-screen measurement of length, slope, area, volume and time interval, and their significance for 2-D images and spectral Doppler displays
- Methods of measuring LV volume, including biplane area, area-length and Simpson's rule
- Derivation of Stroke Volume, Ejection Fraction and LV Mass
- Doppler determination of cardiac output, ejection time and velocity acceleration
- Trans-mitral flow parameters: E/A ratio, e-slope, IVRT
- Measurement of pulmonary pressures from tricuspid and pulmonary regurgitant flow velocities
- Peak and Mean pressure gradient measurements by Doppler and their relationship to catheterisation data

2.3 Heart Valve Disease

2.3.1 Mitral Valve Disease

2.3.1.1 Echo and Doppler features of the normal mitral valve

2.3.1.2 Rheumatic mitral stenosis

- Qualitative description of valve and sub-valve calcification/fibrosis
- Measurement of MV area by planimetry
- Doppler assessment of mean and end-diastolic gradient
- Doppler assessment of area by 'Pressure half-time': technique and limitations
2.3.1.3 Mitral regurgitation

- **Aetiologies and typical echocardiographic features of:**
  - rheumatic mitral annular calcification ‘floppy MV’
  - ischaemic
  - functional
  - infective endocarditis

- **Assessment of severity by:**
  - Chamber sizes/volume overload
  - CW Doppler
  - Colour Doppler
  - Indirect effects
  - Role of TOE in assessing aetiology & severity

2.3.2 Aortic Valve disease

2.3.2.1 Echo & Doppler features of the normal aortic valve

2.3.2.2 Aortic Stenosis

- **Aetiologies and echocardiographic features:** rheumatic, bicuspid, senile degenerative, Sub- and supra-valve obstruction
  - Assessment by CW Doppler
  - Peak and mean gradients
  - Apical, right parasternal & suprasternal positions
  - Continuity equation
  - Assessment of LV hypertrophy & LV function

2.3.2.3 Aortic regurgitation

- **Aetiologies and typical echocardiographic features of:**
  - rheumatic
  - bicuspid valve
  - aortic root disease
  - infective endocarditis (including root abscesses)

- **Assessment of severity by:**
  - Chamber sizes/volume overload
  - CW Doppler
  - Colour Doppler
  - Indirect effects
  - Role of TOE in assessing aetiology & severity

2.3.3 Tricuspid Valve Disease
2.3.3.1 Echo and Doppler features of the normal tricuspid valve

2.3.3.2 Rheumatic tricuspid stenosis
- Echocardiographic features
- Assessment of severity by imaging and Doppler

2.3.3.3 Tricuspid regurgitation
- Aetiologies and echocardiographic features of:
  - rheumatic
  - prolapse
  - congenital
  - endocarditis
  - carcinoid
  - functional
- Assessment of severity by:
  - 2-D imaging & M-mode
  - CW Doppler
  - Colour Doppler
  - Indirect effects

2.3.4 Pulmonary Valve Disease

2.3.4.1 Echo and Doppler features of the normal pulmonary valve

2.3.4.2 Pulmonary valve stenosis
- Echocardiographic features
- Assessment of severity by CW Doppler
- Detection of infundibular obstruction by PW Doppler

2.3.4.3 Pulmonary regurgitation
Aetiologies & echocardiographic features
Assessment of severity by:
- CW Doppler
- Colour Doppler
- Indirect effects

2.4 Infective Endocarditis
- Typical echocardiographic findings in bacterial and fungal endocarditis
- Preferred locations for vegetations
- 'Jet' lesions
- Endocarditis associated with congenital lesions and HCM
- Role of TOE in suspected endocarditis

2.5 Prosthetic Valves
2.5.1 Echo and Doppler features of the main types of prosthetic valve

- Ball & cage
- Tilting Disc
- Bioprosthesis
- Age-related deterioration of bioprostheses
- Role of TOE for examining normal and malfunctioning prosthetic valves

2.5.2 Prosthetic valve stenosis

- Assessment by 2-D and Doppler
- Limitations of CW Doppler assessment of Prosthetic valves
- Use of pressure half-time method for mitral protheses
- Use of Continuity equation for aortic prostheses

2.5.3 Prosthetic valve regurgitation

- Trans- versus para-valvar regurgitation
- Assessment by CW, PW and Colour Doppler
- Colour artefacts from mechanical prostheses

2.6 Cardiomyopathies

Classification, Role of echocardiography & Doppler is assessment and follow-up of patients with idiopathic heart failure

2.6.1 Dilated Cardiomyopathy

Echo and Doppler features of dilated cardiomyopathy

Detection and assessment of associated lesions:

- Functional valve regurgitation
- Thrombus in cardiac chambers
- Pericardial effusions

2.6.2 Hypertrophic Cardiomyopathy

Echo and Doppler features of hypertrophic cardiomyopathy

Differentiation from other causes of cardiac hypertrophy, e.g. 'athletic heart'

Techniques for:

- Measurement of LV wall thicknesses
- Detection of intra-cavity gradient
- Assessment of RV involvement
- Associated abnormalities
- Mitral regurgitation

2.7 Coronary Artery Disease

- Anatomy & nomenclature of the major branches of the coronary arteries
Relationship of coronary anatomy to standard echocardiographic imaging planes
Nomenclature and analysis for regional wall motion
Analysis of segmental systolic myocardial function
Diastolic dysfunction in coronary artery disease

2.8 Myocardial infarction and its sequelae

Echo and Doppler features of:
- post-infarction VSD
- mitral papillary muscle rupture
- tamponade
- mural thrombus
- myocardial scarring
- Dressler's syndrome
- left ventricular aneurysm

2.9 Pulmonary Hypertension

Echo and Doppler features of pulmonary hypertension
Assessment of pulmonary pressures from CW Doppler measurements of tricuspid and pulmonary regurgitation and PA acceleration time

2.10 Contrast Studies
- Spontaneous echo contrast as a sign of stagnant blood flow
- Optimisation of machine control settings for detecting contrast
- Indications for bubble contrast study
- Technique for performing hand-agitated contrast study
- Clinical precautions
- Awareness of newer contrast agents and techniques

2.11 Intracardiac masses
- Typical locations for formation of intracardiac thrombus
- Echocardiographic features of a typical LA myxoma
- Differentiation of myxoma from other cardiac tumours
- Echocardiographic features of carcinoid
- Features suggestive of malignancy

2.12 Pericardial Disease

2.12.1 Anatomy of the normal pericardium as seen by echocardiography
Relationships of serous pericardium to the heart and great vessels. Transverse and oblique sinuses of the pericardium

2.12.2 Echocardiographic features of pericardial fluid
- Location of fluid in relation to patient position and fluid volume
- Differentiation from pleural effusion
• Assessment of volume of pericardial fluid
• Significance of fibrin strands in fluid

2.12.3 Pathophysiological features of pericardial effusions
• Abnormal motion of the heart
• Electrical alternans
• Collapse of RA and/or RV walls
• Assessment of constriction by PW Doppler
• Indirect effects: e.g. hepatic vasculature

2.13 Disease of the Aorta

Technique for examining the ascending and descending thoracic aorta

Echocardiographic features of the normal aortic root, sinuses of Valsalva, ascending aorta and aortic arch

Echo and Doppler features of:
• Marfan’s syndrome
• Sinus of Valsalva aneurysm
• Thoracic aortic aneurysm
• Aortic dissection
• Additional features related to aortic dissection:
  • Aortic cusp prolapse
  • Aortic regurgitation
  • Fluid in pericardium
  • Role of transoesophageal echocardiography in the diagnosis of aortic dissection

2.14 Adult Congenital Heart Disease

Anatomy, pathophysiology and natural history of common congenital lesions present in adults:

Echo and Doppler features of the following, as seen in the older child or adult
• Atrial Septal Defects
• Perimembranous and muscular ventricular septal defects
• Partial and complete atrio-ventricular septal defects
• Persistent ductus arteriosus
• Bicuspid aortic valve
• Aortic coarctation
• Pulmonary stenosis
• Ebstein’s anomaly
• Fallot’s tetralogy
• Limitations of colour Doppler in evaluating shunts in adults
• Role of contrast echocardiography in evaluating shunts in adults
• Role of transoesophageal echocardiography
3. PAEDIATRIC ECHOCARDIOGRAPHY

- Very basic cardiac embryology.
- **Scanning techniques**
  Cross-sectional echo, Doppler, contrast echo.

- **Functional Assessment**
  Volumes, contractility.

3.1 Congenital malformations

- Left-sided volume overload, right sided volume overload.
- LV outflow obstruction, LV inflow obstruction.
- RV outflow obstruction, RV inflow obstruction.
- Anomalies of arterial and venous connections.
- ASD types. VSD types.
- Assessment methods, quantification of shunt flow.
- AV septal defects, Ebstein’s anomaly, arterial duct.
- Coarctation of the aorta.
- Complex congenital anomalies.
- Intraoperative
- Foetal Echo.

4. SPECIALISED TOPICS

4.1 Transoesophageal Echo

- Standard views. Placement technique.
- Outpatient versus intraoperative. Indications.
- Abnormalities, aortic dissection, prosthetic valve assessment, endocarditis, embolic source,
- LV function assessment.
- Transducer maintenance.

4.2 Advanced Echo topics

- Arrhythmias, conduction disturbances, effect on valve motion, effect on wall motion, effect on Doppler flow velocity.
- Assessment of diastolic function,
- Contrast echo, myocardial perfusion studies,
- Stress echo; indications, methods.
- Haemodynamic parameters from Doppler.
- Venous inflow recording, constriction, restriction.
- Peripheral vascular imaging basics.
- Assessment of abdominal aorta
- Tissue Doppler and Speckle Tracking; principles and applications

4.3 Advanced Instrumentation Topics.

- Image features and artefacts.
- Assessment of instruments.
• Calibration, resolution measurements.
• Quality assurance methods.
• Bioeffects and safety; acoustic exposure, dosimetric quantities.
• Electrical safety.
• Evaluation of image and Doppler quality.
• Intraoperative echo.

5. PRACTICAL EXAMINATION OF SCANNING TECHNIQUE AND ANALYSIS OF RECORDINGS

NOTE: The machine used for this assessment should be one with which the student is familiar. If this is not possible, then due account will be taken of this fact.

5.1 General

5.1.1 Relationship with patients
- Introducing self to patient and checking patient's identity
- Explaining the procedure in terms relevant to the particular patient
- Respect for patients' modesty and cultural backgrounds
- Addressing patients and colleagues in a courteous and correct manner
- Handling requests for information about the study findings

5.1.2 Equipment and environment
- Requirements of the recording environment: bed/couch, lighting, temperature
- Patient & operator comfort
- Supplies, etc. (paper towels, jelly, ECG electrodes)
- Appropriate setting up of machine controls, transducer selection, etc.

5.1.3 Planning the procedure
- Appropriate understanding of the clinical request form
- Techniques and views needed to provide required data

5.1.4 Standard imaging procedure
- Preparation and positioning of the patient
- Transducer positioning
- Standard cross-sectional views, correlation with anatomy
  - Parastemal long-axis: LV, RV inflow and RV outflow
• Parastemal short-axis: main PA, aortic root, TV, MV, LV
• Apical: four chamber, five chamber, two chamber and long-axis
• Sub-costal: Transverse & longitudinal IVC/aorta, short axis and four-chamber
• Suprasternal: aortic arch

Adjustment of machine controls, patient and transducer positioning to optimise images

Techniques for 'difficult' patients, e.g. mastectomy, kyphoscoliosis, COAD, dementia

Awareness of common artefacts and methods of identifying and removing them

On-screen measurements of cavity sizes, wall thicknesses (not areas or volumes)

5.1.5 Basic Doppler procedure

• Selection of CW, PW and Colour Doppler modes
• Basic control settings appropriate to each mode
• CW, PW and Colour recordings of: mitral and tricuspid inflow, aortic and pulmonary outflow
• Recognition of basic flow abnormalities associated with valve stenosis and regurgitation

5.1.6 Measurements & calculations

• Perform standard echo measurements and calculations, both using machine software and manual methods. Understand limitations of M-mode echo
• Perform basic calculations (shortening fraction, 'cube' volumes) using machine software and manual methods
• Understand when it is/is not appropriate to provide measurement and/or calculation data
• Prepare measurements and calculated data for reporting

5.1.7 Record-keeping

Understand the importance of documenting work done, including medico-legal aspects

Discuss the merits/deficiencies of the system used in the student's own department
Vascular Ultrasound

MSc in MEDICAL ULTRASOUND: Subspecialty - Vascular Ultrasound
Module lead: Dr. Mohammed Aslam (m.aslam@imperial.ac.uk)

1. **Anatomy, physiology, pathophysiology**
   
i. **Cardiac**
   a. Electrophysiology and the conduction system
   b. Mechanical considerations and events
   c. Phases of the cardiac cycle
   d. Left ventricular function
   e. Pulmonary-systemic circulation

   ii. **Vascular**
   a. Arterial and venous vessel anatomy
   b. Regulation of arterial pressure
   c. Peripheral vasoconstriction/vasodilatation
   d. Capillary circulation

   iii. **Pathophysiology**
   a. Valvular stenosis and incompetence
   b. Vessel constriction
   c. Aneurysmal dilatation
   d. Arterio-venous malformations/fistulas

2. **Haemodynamics**
   
i. Energy gradients
   ii. Effects of viscosity, friction and inertia
   iii. Pressure/flow relationships
   iv. Velocity
   v. Steady flow/pulsatile flow
   vi. Effects of stenosis on flow characteristics
      a. Direction, turbulence, disturbed flow
      b. Velocity & acceleration
c. Entrance/exit effects
d. Diameter reduction
e. Peripheral resistance
f. Collateral circulation
g. Effects of exercise
h. Occlusion

3. **Advanced Doppler Techniques**
   i. Spectral analysis
      a. Discrete Fourier Transforms
      b. Autocorrelation techniques
   ii. Colour haemodynamic systems
      a. Colour Doppler systems
      b. Power/energy systems
      c. Harmonic imaging
   iii. Velocity vector analysis & display
   iv. Digital radiofrequency signal processing

4. **Doppler signal quantification**
   i. Empirical
      a. Degree of stenosis: Peak velocity/vel. ratios
      b. Peripheral resistance parameters.
      c. Transit time measurements
   ii. Curve fitting methods
      a. Principal component analysis
   iii. Mathematical models
      a. Laplacian analysis
   iv. Quantitative blood flow rate measurements
   v. Vessel compliance measurements.

5. **Cerebrovasculature**
   i. Carotid circulation
   ii. Vertobasilar
iii. Intracranial

For i,ii,iii:
   a. Anatomy and physiology
   b. Pathology and pathophysiology
   c. Haemodynamics
   d. Test protocols
   e. Diagnostic criteria
   f. Interpretation of results/reporting
   g. Latest developments

iv. Interventional techniques

v. Angiography

6. Vascular Technology

i. Tissue mechanics/pressure transmission
   a. Venous occlusion by limb positioning
   b. Superficial venous occlusion by tourniquets
   c. Venous occlusion by cuffs
   d. Volume changes by blood inflow/outflow
   e. Arterial occlusion by cuffs

ii. Plethysmography
   a. Displacement (pneumatic cuff)
   b. Photoplethysmography
   c. Impedance plethysmography
   d. Strain gauge
   e. Oculoplethysmography – pressure
   g. Opto-electronic plethysmography

iii. Pressure measurements/exercise testing
   a. Upper limb
   b. Lower limb

iv. Laser Doppler flowmetry

iv Laser Scanning

xii Transcutaneous oxymetry
7. **Contrast Agents**
   i. Manufacture and properties
   ii. In vivo acoustic properties
   iii. Current clinical studies
   iv. Harmonic Imaging
   v. Stimulated acoustic emission

8. **Peripheral Vasculature**
   i. Lower Limb
   ii. Upper limb
   iii. Graft surveillance
   For i-iii:
     a. Anatomy and physiology
     b. Pathology and pathophysiology
     c. Haemodynamics
     d. Test protocols
     e. Diagnostic criteria
     f. Interpretation of results/reporting
     g. Latest developments
   iv. Interventional techniques
   v. Angiography

9. **Venous Haemodynamics**
   i. Venous Resistance
   ii. Hydrostatic pressure
   iii. Pressure/volume relationship
   iv. Effects of oedema
   v. Effects of muscle pump mechanism
      a. at rest
      b. contraction
      c. relaxation

10. **Peripheral Venous/lymphatic system**
    a. Lower Limb
b. Upper limb

For a and b:

i. Anatomy and physiology
ii. Pathology and pathophysiology
iii. Haemodynamics
iv. Test protocols
v. Diagnostic criteria
vi. Interpretation of results/reporting

d. Interventional techniques
e. Angiography

11. Aorta and branches; Inferior Vena Cava

i. Aorta
ii. Coeliac axis
iii. Hepatic a. and portal venous system
iv. Renal a. and branches
v. Superior mesenteric
vi. Inferior vena cava

For i - vi:

a. Anatomy and physiology
b. Pathology and pathophysiology
c. Test protocols
d. Diagnostic criteria
e. Interpretation of results/reporting
f. Latest developments

vii. Interventional techniques

viii. Angiography
Imperial Mobile app

Don’t forget to download the free Imperial Mobile app for access to College information and services, including your course timetable, College emails and a library catalogue search tool.

www.imperial.ac.uk/imperialmobile
3. Assessment

Students will be assessed in a programme of informal tutorials and by requested essays during the taught modules. As part of the continuous assessment exercise, the practical's in medical ultrasound and the patient logs will be written up by the students and marked by teachers.

Elements

The following elements will make up the final examination mark for the degree of MSc in Medical Ultrasound. **It is important to note that you must obtain a pass (50%+) in each exam (not element) to pass the MSc.**

One) *An examination composed of -*
   i) two hour written paper on Physics;
   ii) two hour written paper and a one hour MCQ paper on chosen speciality (echo or Vascular);

Two) *Assessment of clinical competence -*
   i) Presentation of the patient log
   ii) Clinical examination.

Three) *Assessment of the project dissertation -*
   i) Written thesis
   ii) **Vive voce.**

Part-time students will take physics and speciality examinations in the first year, and assessment of clinical competence and the dissertation in the second year.

ECTS allocation

**Element One** 20 ECTS
- Paper 1 (Physics)
- Paper 2 (Speciality exam)

**Element Two** 38 ECTS
- Clinical examination
- Clinical log book
- Diagnostic reporting

**Element Three** 32 ECTS
- Thesis
- **Viva voce**
Past exam papers
These are not currently available for this course. Sample questions will be given during tutorials.

Research Thesis and Viva Voce
In September, students are examined on their research projects. The viva voce is conducted by an internal and an external examiner.

The project work will be written up in thesis form (see Thesis Guidelines later in this chapter) and submitted for internal and external examiners for assessment. The mark awarded will be based on the quality of the thesis, the student’s comprehension of the work (assessed in the viva voce) and the report submitted by their supervisor on their general performance in the laboratory and related areas (e.g. literature awareness).

The student will be expected to have demonstrated a competent grasp of the subject and submitted a satisfactory dissertation. Here satisfactory does not refer to size but to quality. Attention must be given to presentation - some students have not been awarded their MSc because of careless presentation, e.g. poor spelling, inadequate use of grammar, poorly drawn figures, captions or tables, etc. Your ability to behave as a professional is being assessed; unprofessional work will not be accepted as suitable for the MSc.

The viva voce will take place in September the same two examiners will perform the viva voce as read the thesis. Students are not informed of the identity of their examiners in advance of the day of the viva. The examination lasts 15 mins and explores the detail of the research thesis and surrounding literature.
Marking scheme

Individual items of work will be marked on the university's 100-point scale, applying the following marking criteria:

70% and above: Distinction
This is for work that achieves all that could reasonably be expected of a Master's student, and, for example:

(a) is well argued, making excellent use of appropriate evidence;
(b) presents an original argument;
(c) displays a sophisticated knowledge of the area;
(d) establishes productive links between different areas of ultrasound, or between ultrasound and other disciplines;
(e) presents work meticulously conducted, and data fully analysed and interpreted.

60 — 69% Merit
This is for clear work with a well-defined focus, that is significantly better than adequate for Masters-level work and:

(a) is well organised and uses appropriate evidence and information sources effectively;
(b) competently and critically evaluates theoretical ideas and empirical research, as appropriate;
(c) displays highly competent selection and application of methodology, analysis and interpretation of data, as appropriate;
(d) is well-written and presented.

50 — 59% Pass
This is for work that reaches the overall standard required of a Masters student. It:

(a) demonstrates adequate working knowledge of material and techniques
(b) is accurate and sets out relevant information clearly;
(c) includes a thoughtful discussion of issues, theories etc, but
(d) may omit some relevant material or contain minor errors.

47 — 49% Borderline Fail
This is for work that might be acceptable with additional work. Such work would typically:

(a) contain acceptable but limited use of material on core concepts of the course;
(b) use appropriate methodology but in limited or inadequate way;
(c) exhibit significant defects in the quality of writing and presentation;
(d) contain significant errors or omissions.

46% and below: Fail
This is for work that shows a lack of basic knowledge and ability. It would normally exhibit one or more of the following features:
(a) key points are missing;
(b) it is inaccurate with respect to important points;
(c) assertions are not supported by appropriate evidence;
(d) there is poor application of empirical or analytic techniques;
(e) discussion is at too elementary a level;
(f) it exhibits major defects in presentation of ideas or reporting of research.
Borderline Grades
All grades on borderlines are referred to the external examiner for that subject to review the work undertaken.

Key dates for submission
Please refer to the important course dates on blackboard.

Re-Sit information
You are permitted to re-enter once any failed exam at the next sitting. This is usually within the next academic year.

Anonymity
Written and MCQ examinations are marked anonymously. Clinical exam, patient log and dissertations are not. The exam board is not anonymous.

Exam Regulations
Click on links below to access:
- College Academic and Examination Regulations
- Penalties for late submission of work
- Mitigating Circumstances policy and procedure
- Exams and religious obligations
Plagiarism
Plagiarism is the presentation of another person’s thoughts, words, images or diagrams as though they were your own. Another form of plagiarism is self-plagiarism, which involves using your own prior work without acknowledging its reuse.

Plagiarism is considered a cheating offence and must be avoided, with particular care on coursework, essays, reports and projects written in your own time and also in open and closed book written examinations.

Where plagiarism is detected in group work, members of that group may be deemed to have collective responsibility for the integrity of work submitted by that group and may be liable for any penalty imposed, proportionate to their contribution.

For further information, please refer to the Cheating Offences Policy and Procedures section on page 20 of this handbook.
4. Board of examiners

Board of Examiners

- Prof P Nihoyannopoulos (Course Director & Echo Tutor)
- Dr M Aslam (Vascular Tutor)
- A Thrush (Physics Tutor)
- Tony Steedman (Administration)
- Prof M Monoghan, Kings College (External Examiner, Echo)
- Dr F Kahn, University of Dundee (External Examiner, Vascular)
- Barry Ward, Freeman Hospital (External Examiner, Physics)

It is common for Master’s level students to have some form of academic or social interaction with their external examiners at some point during or after their studies as well as during the assessment process itself.

It is inappropriate for you to submit complaints or representations direct to external examiners or to seek to influence your external examiners. Inappropriate communication towards an examiner would make you liable for disciplinary action.

External examiners reports can be found here:

5. Location and facilities

Imperial has a number of campuses in London and the South East. All have excellent travel links and are easily accessible via public transport.

Your main location of study will be:

📍 Hammersmith Campus, Du Cane Road, London, W12 0NN

Facilities

Computer access and printing is available at the library within the Commonwealth building.

Shuttle bus

A free shuttle bus runs between our South Kensington, White City and Hammersmith Campuses on weekdays. Seats are available on a first-come, first-served basis. You need to show your College ID card to board. Download the timetable at:

🔗 www.imperial.ac.uk/estates-facilities/travel/shuttle-bus

Maps

Campus maps and travel directions are available at:

🔗 www.imperial.ac.uk/visit/campuses

Accessibility

Information about the accessibility of our South Kensington Campus is available online through the DisabledGo access guides:

🔗 www.disabledgo.com/organisations/imperial-college-london-2
6. Placements

The College defines a placement as:

“work experience, assessed project work, a period of course-based study or a period of research (for which academic credit is awarded and/or where the student remains subject to College student regulations during the relevant period) and where there is a transfer of direct supervision of the student to a third party (i.e. where a member of staff at the third party acts as the day-to-day supervisor/manager) for a period of two weeks or more.”

Academic departments are responsible for managing any study or work placement which forms part of your degree programme. It is expected that you will contribute to the process of planning your placement.

For guidance on this, see the College’s Placement and Learning Policy and associated good practice:

[www.imperial.ac.uk/about/governance/academic-governance/academic-policy/placement-learning](http://www.imperial.ac.uk/about/governance/academic-governance/academic-policy/placement-learning)

For more information on placements visit the Placements website:

[www.imperial.ac.uk/placements](http://www.imperial.ac.uk/placements)

If you are considering/planning a placement outside the UK you should also refer to the Placement Abroad Handbook:

[www.imperial.ac.uk/placements/information-for-imperial-college-students](http://www.imperial.ac.uk/placements/information-for-imperial-college-students)
7. Working while studying

If you are studying full time, the College recommends that you do not work part-time during term time. If this is unavoidable we advise you to work no more than 10–15 hours per week, which should be principally at weekends and not within normal College working hours.

Working in excess of these hours could impact adversely on your studies or health.

If you are here on a Tier 4 visa you can work no more than 20 hours a week during term time. Some sponsors may not permit you to take up work outside your studies and others may specify a limit.

If you are considering part-time work during term time you are strongly advised to discuss this issue with your supervisor or Postgraduate Tutor. If you are on a Tier 4 visa you should also seek advice from the International Student Support team regarding visa limitations on employment.

Please refer to our policy on working while studying:

8. Health and safety

You are responsible for looking after your own health and safety and that of others affected by your College-related work and leisure activities. You must:

- comply with all local and College policies, procedures and codes of practice and with the arrangements which the College has in place to control health and safety risks.
- ensure that your activities do not present unnecessary or uncontrolled risks to yourself or to others.
- attend appropriate induction and training.
- report any accidents, unsafe circumstances or work-related ill health of which you become aware to the appropriate person.
- not interfere with any equipment provided for Health and Safety.
- inform your supervisor or the person in charge of the activity in cases where you are not confident that you are competent to carry out a work or leisure activity safely, rather than compromise your own safety or the safety of others.

The College’s Health and Safety Policy can be found at:


Your Departmental safety contact is:

- Gareth Hyde
- g.hyde@imperial.ac.uk

You may be required to complete inductions and attend training sessions to safely complete this course. These include:

- Campus health and safety induction

**The College Safety Department**

The Safety Department offers a range of specialist advice on all aspects of safety. This includes anything which you feel might affect you directly, or which may be associated with teaching, research or support service activities.

The College’s activities range from the use of hazardous materials (biological, chemical and radiological substances) to field work, heavy or awkward lifting, driving, and working alone or late.

All College activities are covered by general health and safety regulations, but higher risk activities will have additional requirements.
The Safety Department helps departments and individuals ensure effective safety management systems are in place throughout the College to comply with specific legal requirements.

Sometimes the management systems fail, and an accident or a near-miss incident arises; it is important that we learn lessons from such situations to prevent recurrence and the Safety Department can support such investigations. All accidents and incidents should be reported online at:

www.imperial.ac.uk/safety

To report concerns or to ask for advice you should contact your programme director, academic supervisor or departmental safety officer in the first instance. You may also contact the Safety Department directly.

**Occupational Health requirements**

The College Occupational Health Service provides services to:

- protect health at work
- assess and advise on fitness for work
- ensure that health issues are effectively managed

The Service promotes and supports a culture where the physical and psychological health of staff, students and others involved in the College is respected, protected and improved whilst at work.

www.imperial.ac.uk/occupational-health

Please add any department-specific risks which require postgraduate students to be notified to the Occupational Health Service. (See example on page 10 of: Creating your Master’s programme handbook: guidance on completing the template.)
9. College policies and procedures

Regulations for students
All registered students of the College are subject to the Regulations for Students, the College Academic and Examination Regulations and such other regulations that the College may approve from time to time.

Appeal and complaints procedures
We have rigorous regulations in place to ensure assessments are conducted with fairness and consistency. In the event that you believe that you have grounds for complaint about academic or administrative services, or wish to appeal the outcome of an assessment or final degree, we have laid out clear and consistent procedures through which complaints and appeals can be investigated and considered:

Academic integrity
You are expected to conduct all aspects of your academic life in a professional manner. A full explanation of academic integrity, including information on the College’s approach to plagiarism is available on the Student Records and Data website:

Cheating offences policy and procedures
It is important that you learn how to properly attribute and acknowledge the work, data and ideas of others. Plagiarism is scientific misconduct, and students whose assessments can be shown to contain plagiarism are subject to penalties as outlined in the College’s Cheating Offences Policy and Procedures – see Appendix 3 of the Examination Regulations which can be found here:

Fitness to practise medicine

www.imperial.ac.uk/about/governance/academic-governance/academic-policy/complaints-appeals-and-discipline


www.imperial.ac.uk/about/governance/academic-governance/regulations

**Intellectual property rights policy**
For further guidance on the College’s Intellectual Property Rights Policy, please contact the Research Office:

[www.imperial.ac.uk/research-and-innovation/research-office/ip](http://www.imperial.ac.uk/research-and-innovation/research-office/ip)

**Use of IT facilities**
View the Conditions of Use of IT Facilities:

10. Well-being and advice

**Student Space**
The Student Space website is the central point for information on health and well-being.

[www.imperial.ac.uk/student-space](http://www.imperial.ac.uk/student-space)

**Director of Student Support**
The Director of Student Support has overall responsibility for all matters relating to student support and well-being.

[www.imperial.ac.uk/people/d.wright](http://www.imperial.ac.uk/people/d.wright)

**Departmental support and College tutors**
Your Department has a system of academic and pastoral care in place to make sure you have access to the appropriate support throughout your time here. This includes:

**Postgraduate tutor**
The Department’s postgraduate tutor can offer pastoral support and advice. You can arrange to have a meeting with him/her at any time during your studies – what you discuss will be completely confidential.

If necessary they will direct you to an appropriate source of support.
**College tutors**

College tutors operate outside of any department. They provide guidance and assistance to students in regard to welfare issues and are also involved in College disciplinary matters involving students. For more information see:

[www.imperial.ac.uk/student-space/here-for-you/college-tutors-and-departmental-support](http://www.imperial.ac.uk/student-space/here-for-you/college-tutors-and-departmental-support)

**Advice services**

The tutor system is complemented by a College-wide network of advice and support. This includes a number of specialist services.

**Careers Service**

The Careers Service has strong links to your Department and you will have a named Careers Consultant and Placement and Internship Adviser who will run both group sessions and individual meetings within your Department. You can arrange to meet with your linked Careers Consultant or Placement and Internship Adviser either in your Department or centrally on Level 5 Sherfield where the Careers Service is based.

Visit the Career Service’s website to:

- Book a careers appointment
- Find resources and advice on successful career planning

[www.imperial.ac.uk/careers](http://www.imperial.ac.uk/careers)

**Counselling and Mental Health**

The Student Counselling and Mental Health Advice Service offers short-term counselling to all registered students. The service is free and confidential. Counsellors are available at the South Kensington, Hammersmith and Silwood Park Campuses.

[www.imperial.ac.uk/counselling](http://www.imperial.ac.uk/counselling)

**Financial support and tuition fees**

If you’ve got any questions about student financial support (loans, scholarships and research council studentships, US and Canadian loans) then contact the Student Financial Support team:

- 020 7594 9014
- [student.funding@imperial.ac.uk](mailto:student.funding@imperial.ac.uk)
If you suddenly find yourself in financial difficulties or experience an unexpected change in circumstances, you may be eligible to apply for emergency financial help through the Student Support Fund. The Fund offers a one-off payment of up to £2,000 to cover such emergencies as last minute accommodation and travel necessities, equipment and childcare. It does not have to be repaid.

www.imperial.ac.uk/students/fees-and-funding/student-support-fund

For tuition fees queries, contact the Tuition Fees team:

020 7594 8011

tuition.fees@imperial.ac.uk

**Imperial College Union (ICU) Advice Centre**

Imperial College Union runs the Advice Centre independently of the College with advisers on hand to provide free, confidential, independent advice on a wide range of welfare issues including housing, money and debt, employment and consumer rights, and personal safety.

www.imperialcollegeunion.org/advice

**Student Hub**

The Student Hub represents a single point of contact for all key administrative information and support. The Student Hub team can help you with enquiries about:

- Accommodation (including checking contracts for private accommodation)
- Admissions
- International student enquiries
- Research degrees
- Student financial support
- Student records
- Tuition fees

Level 3, Sherfield Building, South Kensington Campus

020 7594 9444

student.hub@imperial.ac.uk

www.imperial.ac.uk/student-hub

**Health services**

**NHS Health Centre and finding a doctor**
Even if you’re fit and healthy we recommend that you register with a local doctor (GP) as soon as you arrive in London. For help finding your nearest GP see the Student Space website:

- www.imperial.ac.uk/student-space/here-for-you/find-a-doctor

There is an NHS Health Centre on our South Kensington Campus which you may visit during clinic hours if you’re feeling unwell. Students living within the practice catchment area are encouraged to register with the Centre.

- www.imperialcollegehealthcentre.co.uk

**NHS Dentist (based in the Health Centre)**

Imperial College Dental Centre offers a full range of NHS and private treatment options.

- www.imperial.ac.uk/student-space/here-for-you/dentist

**Disability support**

**Disability Advisory Service**

The Disability Advisory Service provides confidential advice and support for all disabled students and students with specific learning difficulties.

If you think you may have dyslexia or another specific learning difficulty but have never been formally assessed, the Disability Advisory Service offers initial screening appointments.

- Room 566, Level 5, Sherfield Building, South Kensington Campus
- 020 7594 9755
- disabilities@imperial.ac.uk
- www.imperial.ac.uk/disability-advisory-service

**Departmental Disability Officers**

Departmental Disability Officers are the first point of contact within your department. They can apply for additional exam arrangements on your behalf, and will facilitate support within your Department.

- Dr Michael McGarvey
- m.mcgarvey@imperial.ac.uk

More information on Departmental Disability Officers is available at:

- www.imperial.ac.uk/disability-advisory-service/support/ddos
More information on procedures for the consideration of additional exam arrangements in respect of disability is available at:


### Library and IT

#### Information and Communications Technologies (ICT)

If you’re having problems with technology (including computers, laptops and mobile devices), you can get help from ICT’s Service Desk.

- **020 7594 9000**
- [www.imperial.ac.uk/ict/service-desk](http://www.imperial.ac.uk/ict/service-desk)

#### Software shop

The Software shop offers a variety of general and subject specific software programs and packages for free or at a discounted price for Imperial students.

- [www.imperial.ac.uk/admin-services/ict/shop/software](http://www.imperial.ac.uk/admin-services/ict/shop/software)

#### Library services

The Central Library at South Kensington is open around the clock pretty much all year. Make sure you find out who your departmental librarian is as they’ll be able to help you find resources for your subject area. Also, don’t forget to check out the Library’s range of training workshops and our other campus libraries for access to specialist medicine and life sciences resources. Alongside these physical spaces and resources, the Library provides over 170,000 electronic books, journals and databases available both on and off campus and a free document delivery service to help you source books and articles from around the UK and the rest of the world:

- [www.imperial.ac.uk/library](http://www.imperial.ac.uk/library)

#### Religious support

The Chaplaincy Multi-faith Centre has chaplains from many different religions, as well as prayer rooms and information on places of worship. In addition, it runs meditation classes and mindfulness workshops for stress management. There is a student-run Islamic prayer room on campus and separate areas available for male and female Muslims.

- [www.imperial.ac.uk/chaplaincy](http://www.imperial.ac.uk/chaplaincy)

### Support for international students
**English language support**

The Centre for Academic English provides free in-sessional English courses for international students while they are studying. These include classes and workshops on academic language, social language, the four skills of reading, writing, listening and speaking, 1-1 consultations with a tutor to work on a piece of academic writing or an oral presentation, self-study resources in the VLE Blackboard, and the Conversation Project, which partners students with a native-speaker volunteer to practise social and conversational English.

[www.imperial.ac.uk/academic-english](http://www.imperial.ac.uk/academic-english)

**International Student Support team**

Students from outside the UK make up around half of our student population, so our International student Support team offers year-round support to help our international students settle into Imperial life. This includes UK visa and immigration advice and trips to different places of interest.

[www.imperial.ac.uk/study/international-students](http://www.imperial.ac.uk/study/international-students)
The Student Records and Data team are responsible for the administration and maintenance of the student records for all students studying at the College. This includes enrolments, programme transfers, interruption of studies, withdrawals and processing of examination entry for research degree students. The team also use this information to fulfil reporting duties to the Student Loans Company, Transport for London and the UKVI, as well as other external bodies.

The team is currently responsible for the processing of student results and awards on the student record system as well as the production and distribution of academic transcripts and certificates of award.

Student Records and Data produce a variety of standard document requests for both current and previous students including council tax letters, standard statements of attendance and confirmation of degree letters.

Appeal administration also sits within the team, as does the responsibility for confirming qualifications via the Higher Education Degree Datacheck service.

### Student records and examinations

📞 +44 (0)20 7594 7268  
📧 records@imperial.ac.uk

### Degree certificates

📞 +44 (0)20 7594 8037  
📧 certificates@imperial.ac.uk
12. Work-life balance

The pace and intensity of postgraduate study at Imperial can be demanding so it’s important to find time for outside interests.

**Imperial College Union**
The Union’s range of 340+ student-led clubs, societies and projects is one of the largest of any UK university, opening up lots of ways for you to enjoy your downtime.

[www.imperialcollegeunion.org/about-us](http://www.imperialcollegeunion.org/about-us)

**Graduate Students’ Union**
The Graduate Students’ Union is the postgraduate arm of Imperial College Union. The GSU works alongside the Imperial College Union President to ensure that the requirements of postgraduate students are catered for. It also organises a number of academic and social events during the year.

[www.union.ic.ac.uk/presidents/gsu](http://www.union.ic.ac.uk/presidents/gsu)

**Sport**
Beginners and semi-professionals alike will receive a warm welcome in our sports clubs, which are subsidised by Imperial College Union to make it a little bit cheaper to keep doing a sport you love.

Access to swimming facilities, including sauna, steam room and spa at Ethos sports centre, is completely free from your very first day. Gym facilities across all campuses are also free after you’ve completed a fitness orientation for a one-off charge (£40 in 2016–17).

[www.imperial.ac.uk/sport](http://www.imperial.ac.uk/sport)
13. Student feedback and representation

Feedback from students
The College and Union is committed to continually improving your education and wider experience and a key part of this is your feedback. Feedback is thoroughly discussed by your student representatives and staff.

Student representation
Student Representatives are recruited from every department to gather feedback from students to discuss with staff. More information about the role, and instructions on how to become an academic representative, are available on the Imperial College Union (ICU) website.

www.imperialcollegeunion.org/your-union/your-representatives/academic-representatives/overview

Staff-Student Committee
The Staff-Student Committee is designed to strengthen understanding and improve the flow of communication between staff and students and, through open dialogue, promote high standards of education and training, in a co-operative and constructive atmosphere. College good practice guidelines for staff-student committees are available here:

www.imperial.ac.uk/about/governance/academic-governance/academic-policy/student-feedback
14. Student surveys

Your feedback is important to your department, the College and Imperial College Union. Whilst there are a variety of ways to give your feedback on your Imperial experience, the following College-wide surveys give you regular opportunities to make your voice heard:

- PG SOLE lecturer/module Survey or departmental equivalent
- Student Experience Survey (SES)
- Postgraduate Taught Experience Survey (PTES) – next due to run in spring 2018

The PG SOLE lecturer/module survey or equivalent runs at the end of the autumn and spring term(s) [delete spring if appropriate for your programme]. This survey is your chance to tell us about the modules you have attended and the lecturers who taught them.

For PG SOLE (or equivalent survey) your lecturers will receive their individual numerical results and comments shortly after the survey closes. To make the most of your opportunity to give your feedback, please do not use offensive language or make personal, discriminatory or abusive remarks as these may cause offence and may be removed from the results. Whilst this survey is anonymous, please avoid self-identification by referring to personal or other identifying information in your free text comments.

The Student Experience Survey (SES) is another opportunity to leave your views on your experience. This survey will cover your induction, welfare, pastoral and support services experience.

The Postgraduate Taught Experience Survey (PTES) is the only national survey of Master’s level (MSc, MRes, MBA and MPH) students we take part in. This is the only way for us to compare how we are doing against the national average and to make changes that will improve our Master’s students’ experience in future. PTES covers topics such as motivations for taking the programme, depth of learning, organisation, dissertation and professional development. PTES last ran in spring term 2016 and will run again in spring 2018.

All these surveys are anonymous and the more students that take part the more representative the results so please take a few minutes to give your views.

As a result of feedback to previous surveys, we have [insert departmental examples of changes that have been made.]

The Union’s “You Said, We Did” campaign shows you some of the changes made as a result of survey feedback:

- www.imperialcollegeunion.org/you-said-we-did

If you would like to know more about any of these surveys or see the results from previous surveys, please visit:

- www.imperial.ac.uk/students/academic-support/student-surveys/pg-student-surveys

For further information on surveys, please contact the Registry’s Surveys Team at:

- surveys.registysupport@imperial.ac.uk
15. And finally

**Alumni services**
When you graduate you will be part of a lifelong community of over 190,000 alumni, with access to a range of alumni benefits including:

- discounts on further study at the College and at Imperial College Business School
- alumni email service
- networking events
- access to the Library and online resources
- access to the full range of careers support offered to current students for up to three years after you graduate
- access to our Alumni Visitor Centre at the South Kensington Campus, with free Wifi, complimentary drinks, newspapers and magazines, and daytime left luggage facility

Visit the Alumni website to find out more about your new community, including case studies of other alumni and a directory of local alumni groups in countries across the world.

[www.imperial.ac.uk/alumni](http://www.imperial.ac.uk/alumni)

**Opportunities for further study**
After you have completed [insert course name], you may choose to [insert opportunities within Imperial]. Previous graduates have gone on to [insert achievements or courses studied].