MRes
in
Biomedical Research
(Cardiovascular Science, Technology & Medicine Stream)

Imperial College London

Preliminary Information
2008/9
1. INTRODUCTION

Welcome to Imperial College and to this exciting opportunity to be part of a major new cross-disciplinary effort into the study and advancement of novel technologies for treating heart disease.

Over 2.6 million people in the UK live with heart disease and nearly a million suffer with heart failure (source: British Heart Foundation). It is widely recognized that the pace of innovative progress in the research, prevention, and treatment of heart disease and heart failure requires utilizing the expertise of researchers in fields that have perhaps not traditionally engaged with biomedical science, such as the physical sciences, mathematics and computational biology. A new British Heart Foundation (BHF) Centre of Research Excellence has been established at Imperial College London as of April 2008 through a multi-million pound award. The Award Director is Professor Michael Schneider, who joined Imperial College last year as Head of Cardiovascular Science in the National Heart & Lung Institute (NHLI) Division of the Faculty of Medicine. A principal aim of the BHF Centre of Research Excellence is to train the young investigators of the future in cardiovascular science in ways that exposes them to disciplines which have been traditionally segregated from each other. We aim to foster cross-disciplinary interactions and teaching of the highest quality that exploits the world-class reputation of Imperial College’s scientists and clinicians and thus allow us to develop novel approaches in the understanding, prevention and diagnosis of problems of the heart and vasculature. The continuing use and development of model organism systems for understanding heart disease and for formulating new therapeutic strategies is integral to meeting these challenges.

As a student enrolled on a postgraduate programme at Imperial, you are automatically a member of the Graduate School of Life Sciences and Medicine (GSLSM). The Graduate Schools at Imperial College oversee the quality of the graduate programmes and ensure that the research environment is of the very highest standard. In addition, the Graduate Schools provide a variety of short workshops to further develop and enhance postgraduate
training and excellence with a focus on cross-disciplinary and transferable skills. These include modules on how to use statistics to analyze your results, how to write a thesis and improving presentation skills. The Graduate Schools won the Times Higher Awards 2006 in the category of Outstanding Support for Early Careers Researchers. More than 90 UK universities took part in the awards and it was the judges' opinion that "Imperial College has taken an innovative and integrated approach to supporting early-careers researchers."

When you arrive at Imperial, you will receive a copy of our course handbook which contains all the essential information concerning the organisation and requirements of your specific programme, together with useful information about the Departments contributing to delivery of the MRes degree course. This preliminary information, however, is intended to give you a flavour of the MRes course components and a brief timetable of events in the first few weeks of your study.

We look forward to meeting you in October!

Nigel J. Brand, PhD
Education Co-ordinator,
Cardiovascular Science, Technology & Medicine (CSTEM) stream
2. BRIEF OVERVIEW OF THE BHF AWARD

This year saw the creation of four UK Centres of Research Excellence by the British Heart Foundation. The development of the successful BHF Centre of Research Excellence bid by Imperial College was spearheaded by Professor Michael Schneider, former holder of the M.D. Anderson Foundation Chair at Baylor College of Medicine (2000-07), who joined Imperial College in September 2007 to become Head of Cardiovascular Sciences and Chair in Cardiology in the NHLI Division. Professor Schneider’s involvement over 15 years in the NIH Training Programme in Molecular Cardiology at Baylor (Programme Director from 2004-07), and his experience managing major grants such as a current grant from Fondation Leducq (“Transatlantic Network of Excellence for Cardiac Regeneration”) involving scientists in four countries, is well-matched to the challenge of promoting innovation and skills-exchange across College at the highest level in a multidisciplinary environment.

Professor Schneider is supported by a team of six outstanding co-award holders:

**Professor Dorian Haskard**
Deputy programme director, BHF Sir John McMichael Professor of Cardiovascular Medicine and Head of Vascular Sciences within NHLI (Hammersmith campus).

**Professor Nicholas Peters**
Professor of Cardiology and Head of Cardiac Electrophysiology based at the St Marys campus; Chair of the Cross-Faculty Task Force for course-planning and Educational Chair.

**Professor Nadia Rosenthal**
Head of the European Molecular Biology Laboratory (EMBL) Mouse Biology Outstation at Monterotondo, Rome, and Director of Science at the Heart Science Centre, NHLI, Harefield campus; also, Director of the Australian Regenerative Medicine Institute at Monash University, Victoria.

**Professor Timothy Aitman**
Professor of Clinical and Molecular Genetics; Group Head/Section Chair of the Physiological Genomics & Medicine Group at the Medical Research Council Clinical Sciences Centre, Hammersmith campus.

**Professor David Klug**
Professor of Chemical Biophysics in the Department of Chemistry, South Kensington campus; co-Chair/Founder of the Chemical Biology Centre (CBC).

**Professor Spencer Sherwin**
Professor of Computational Mechanics in the Department of Aeronautics, South Kensington campus.
3. ARRIVING AT IMPERIAL COLLEGE

I know that some of you will be familiar with Imperial College from your undergraduate training, but the majority will perhaps be living and working in London for the first time. We have arranged a series of introductory and welcome events within the first two weeks, which will also give you an opportunity to meet fellow students enrolled on other streams within the MRes in Biomedical Research, and to discover the social side that Imperial has to offer.

Some of you will be entering directly into a PhD programme, and not registering for the Masters of Research degree. By the end of the first two weeks, those of you registered for the MRes will have chosen your first MRes project (due date for this is Thursday 16th October). PhD topics will also be finalised by this time. Full details will be available at your Induction on October 2nd (see below) when you will receive the course booklet.

Some dates to note for your diary:

Thursday October 2nd
10 am: Welcome meeting and Induction with Professor Michael Schneider, Director of the BHF Centre of Research Excellence, Dr Nigel Brand and Dr Katie Payne. Whiteley 1 lecture theatre, Royal College of Science building 1 (RCS: 36 on South Ken map), South Kensington campus

2 pm: Start of the crossover courses

6 pm: Annual NHLI/RBH Paul Wood Cardiovascular Lecture 2008. Paul Wood Lecture Theatre, Guy Scadding Building, Dovehouse Street, Royal Brompton Campus

‘The Cardio-Renal Syndrome: How Do the Heart and the Kidneys Communicate?’ presented by Professor Gary Francis, Department of Cardiovascular Medicine, Cleveland Clinic Foundation, Cleveland, USA.

Attendance is free, but please register in advance with Dr Emma Watson (e.watson@imperial.ac.uk)

Monday October 6th
morning: Registration and enrolment as a student of Imperial College. Sherfield building, (21 on South Ken map)

Monday October 6th
4 - 5 pm: Welcome by the Rector of Imperial College, Great Hall, Sherfield building

Tuesday October 7th
afternoon: Fresher’s Fair. A chance to find out about the many clubs and societies that life at Imperial has to offer
Friday October 10th  
4 pm: Joint Biomolecular Medicine Welcome Party – Sir Alexander Fleming (SAF) atrium, 3rd floor coffee area (35 on South Ken map)

Tuesday October 14th  
4 – 5.30 pm: GSLSM Welcome Session, Great Hall, Sherfield Building.

Wednesday October 15th  
5.30 pm: Inaugural Professorial Lecture. Lecture Theatre G16, Sir Alexander Fleming Building, South Kensington Campus

‘Power and energy: how to get the most out of muscle’

presented by Professor Nancy Curtin, Professor of Muscle Physiology, NHLI.

Attendance is free but with registration in advance with Emma Powell (e.powell@imperial.ac.uk)

4. COURSE OVERVIEW & CONTACTS

The MRes degree course offered within the BHF Centre training programme is a full-time course that is administered through the Department of Biomolecular Medicine, part of the Division of Surgery, Oncology, Reproductive Biology and Anaesthetics (SORA) in the Faculty of Medicine. This main MRes course is organized by Professor Nigel Gooderham, and this year the course has two new streams. In terms of teaching delivery, we will form one of these new streams, called Cardiovascular Science, Technology & Medicine, or CSTEM for short. The Education Co-ordinator for the CSTEM MRes course is Dr Nigel Brand, to whom all questions or problems with the scientific or educational aspects of the CSTEM stream should be addressed. All logistical questions pertinent to the course (e.g. registration issues, entercard queries) should be directed first to Dr Katie Payne, who is the BHF Centre Manager.

As mentioned above, some of you may already have a Masters degree and therefore will be entering directly into a PhD programme, and not registering for a Masters of Research degree. However, we would like you to attend the taught elements of the course. This will provide an opportunity for you and your fellow students to form a strong cross-disciplinary cohort, where you can meet regularly and, we hope, learn from each other. You will find that your colleagues come from a range of undergraduate backgrounds, from biology to engineering, medicine to mathematics. To this end, we have constructed a programme of seminars and journal clubs on Wednesday mornings, specific to the aims of the BHF Centre of Research Excellence, as well as workshops and a chance to visit specific Imperial sites, such as the robotics suite in the Institute of Biomedical Engineering, and the state-of-the-art cardiology labs at St Mary’s hospital. In particular, there is a series of seminars in the first two weeks of term we call “crossover” teaching that we strongly advise you to attend. As you are part of a group of students from diverse scientific backgrounds, we will provide three primer courses in the first two weeks of term, aimed at providing background knowledge you may not have which will help you make the most of your cardiovascular research. These will be aimed at those without a formal biology background (C-BIO), those without a knowledge of heart anatomy or medicine (C-MED) and those without a strong physical sciences/computational sciences background (C-PHYS), but we hope will be more widely attended by others in the Centre of Research Excellence. These teaching elements
are described further in Sections 5 and 6, and full details will be available in the Course Handbook when you arrive at Imperial. In this way, we hope you and your colleagues in the CSTEM cohort will develop a basic “shared” language before the formal teaching programme begins.

5. CROSSOVER COURSES

The C-BIO, C-MED and C-PHYS crossover courses will be taught in the first two weeks of term by members of NHLI, Department of Bioengineering and Medical Research Council (MRC) unit at Hammersmith Hospital. The crossover course content will include:

C-BIO: an introduction to DNA, RNA and proteins; an introduction to cell signalling; introduction to the ‘omics sciences; cardiac metabolism and muscle biology; transgenic animals; systems physiology.

C-MED: cardiovascular anatomy and function; an introduction to cardiovascular pharmacology; cardiac pathophysiology - how the heart goes wrong (including a visit to the Invasive and Non-Invasive Clinical Investigation and Procedure labs at St Marys Hospital, hosted by Professor Nicholas Peters).

C-PHYS: an introduction to the chemistry of imaging, including nuclear imaging (PET, MRI); echocardiography; the mechanics of blood flow; mathematical modelling for biological systems.

Crossover teaching will take place principally at the South Kensington (nearest Tube station, South Kensington on the Circle, District and Piccadilly lines), but occasionally at the Hammersmith Hospital, Royal Brompton Hospital (RBH) and St Marys Hospital campuses. The RBH on Sydney Street is in Chelsea, located about 15 mins walk from the main South Ken campus. St Marys Hospital is in Paddington, which lies about 25-30 mins walk away from the South Ken campus across Hyde Park, and can also be reached on the Circle, District, Bakerloo and Hammersmith & City lines. Maps of the various Faculty of Medicine campuses can be found at http://www3.imperial.ac.uk/campusinfo, or at the end of this booklet.

6. CORE TAUGHT COURSE

Formal teaching on the MRes in Biomedical Research takes place on Wednesday mornings. The rest of the week you will spend on your PhD or MRes research projects in your host labs. For our CSTEM stream, this will take principally the form of five disease-themed modules:

(1) Atherosclerosis and Hypertension (6 weeks)
(2) Myocardial Infarction (5 weeks)
(3) Heart Failure (5 weeks)
(4) Sudden Death and Arrhythmias (5 weeks)
(5) Congenital Heart Disease (5 weeks)

These modules will be divided into 2 or 3 hour Units as follows:
.1 Epidemiology and manifestations  
.2 Investigation, imaging and device development  
.3 Cellular, molecular and genomic biology  
.4 Future therapeutic strategies and model systems  

Each Module will end with a moderated journal club.

7. ACCOMMODATION AND FACILITIES

The research groups participating in the BHF Centre of Research Excellence are located, widely across the campuses of Imperial, including laboratories in the Sir Alexander Fleming (SAF) building, the Departments of Bioengineering, Chemistry and Aeronautics on the South Kensington site, Hammersmith Hospital at White City and St Mary’s Hospital in Paddington. There are also participating scientists and clinicians based at the Royal Brompton campus and at the Heart Science Centre on the Harefield Hospital site in Middlesex. Together, these form a “Network of Networks” between different disciplines, between basic science and clinical practice, that will address key issues in regenerative, genomic and vascular medicine. By choosing a particular project, students will be accommodated and based for the duration of the project within the laboratory of the academic supervisor. Students will gather as a class once a week to participate in the formal teaching, which will be conducted largely at SAF on the South Kensington campus.
The MRes course has its own Blackboard (formerly webCT) site accessible at https://webct.imperial.ac.uk/. There is a separate Blackboard link within the “MRes in Biomedical Research (2008-2009)” pages for the CSTEM stream. This site will act as a focus for information and communication, including a repository of course documents, timetables, suggested core reading material, lecture notes etc. The website for the BHF Centre of Research Excellence is under construction, and will include links to PowerPoint presentations for the core and crossover teaching, audio clips, and on-line teaching resources in bioinformatics or other resources.

Students will have access to the Faculty of Medicine computer cluster (located on the ground floor of SAF), all of the libraries in the Imperial College Library network, and all the facilities provided by the Imperial College Students Union.

8. SUGGESTED READING/STUDY

Below are some free-content web links and books that you might find useful in terms of background study prior to the MRes-PhD coursework and research programmes.

Molecular and cellular biology:

“Molecular Cell Biology” by Lodish et al, Freeman & Co.
http://bcs.whfreeman.com/lodish5e/default.asp

Lots of free content for students. The “bible” for all matters to do with DNA and gene expression, signalling and cell structural biology.

You may also find “Genes IX” by Benjamin Lewin useful.


The best and most comprehensive resource for heart development. Second edition currently being revised.

Cardiovascular physiology:


Biomechanics and blood flow:

Bme_source.org is a shared portal used by the biomedical engineering community, that also has useful links to cardiovascular medicine and other resources.
http://171.65.102.151/~bmesource

“The Mechanics of the Circulation”. CG Caro, TJ Pedley, RA Schroter and A Seed. OUP.


“Cardiovascular Solid Mechanics”. JD Humphrey. Springer.

Also, see the following Imperial pages:

http://www3.imperial.ac.uk/bioflow/research

Contains short tutorials on pulse wave propagation in arterial networks, computational modelling of vascular mass transport, computational fluid modelling.

There is also an excellent introduction to the engineering/cardiovascular interface of blood flow to be found in the following article by Kim Parker and Derek Gibson: Cardiovascular Fluid Dynamics, K.H. Parker and D.G. Gibson in Cardiovascular Haemodynamics (2005)

http://www.bg.ic.ac.uk/Staff/khparker/homepage/BSc_lectures%5CCardiovascular_Haemodynamics.pdf

Professor Parker’s personal website can be found at:

http://www.bg.ic.ac.uk/research/intro_to_wia/

9. USEFUL CONTACTS & INFORMATION

Imperial College Registry

https://www.imperial.ac.uk/registry/forms/index.htm

This is Registry’s website. It is a really good site for finding out more about specific College regulations with regard to postgraduate studies and has links to all the forms that you need to complete at different stages of your PhD. It also has practical details e.g. how to get your council tax exemption, where to get your thesis bound etc.

Assistant Registrar (Postgraduates): Ms Lorna Richardson
l.richardson@imperial.ac.uk; www.imperial.ac.uk/hq/registry/higher

Graduate Schools of Life Sciences and Medicine (GSLSM)

http://www.gradlsm.ic.ac.uk/Default.htm
Follow these links to find information on transferable skills training offered through the GSLSM for postgraduate students, including special lectures and the annual student symposium. Further information on the courses available and the number you will be expected to take in your MRes year will be found in the course booklet handed out at the start of term.

**Student Learning Support**

[http://www3.imperial.ac.uk/graduateschools/transferableskillstraining](http://www3.imperial.ac.uk/graduateschools/transferableskillstraining)

This is a website set up by the Centre for Educational Development that has links to other College sites that cover all different aspects of student life. Covers areas such as maths support, developing writing skills, health and welfare, dyslexia, careers, volunteering etc.

**Student Counselling service: David Allman** (internal ext 49637)

counselling@imperial.ac.uk

**Health Centre**

Reception, extension 49375/6.
External phone number 020 7584 6301.
(healthcentre@imperial.ac.uk)

*Doctors, nurses, psychotherapists, counsellors, psychiatrist, sports medicine specialist, physiotherapy, acupuncture, Alexander Technique, homeopathy, osteopathy, reflexology, aromatherapy. For further information see also [www.imperial.ac.uk/healthcentre](http://www.imperial.ac.uk/healthcentre)*

**Disabilities Officer**

Room 546b Sherfield Building
Loretto O’Callaghan, extension 48935 (l.ocallaghan@imperial.ac.uk)

*Advice and information on issues relating to disability.*

**Student Support Office**

Student Finance (Registry) Sherfield Building Level 3
Philippa Worley, extension 48130 (p.worley@imperial.ac.uk)

*Student funding advice and administration (inc. hardship funds and hardship loans).*
Union Support

Deputy President (Education & Welfare) extension 58064 (dpew@imperial.ac.uk).

Academic and welfare issues.

Union Adviser

Imperial College Union Office, Beit Quad, extension 48067 Jackie Stevenson, (advice@imperial.ac.uk)

Welfare issues including housing, immigration, money & debt advice, health/sexual health awareness, drugs & alcohol. The advisor also works with the Deputy President (Education & Welfare) on matters relating to representation, campaigns and academic issues.

The Chaplaincy Centre

East Basement, Beit Quad, extension 49600

A resource for people of faith on campus and home to a group of chaplains. The Chaplaincy website (www.chaplaincy.ic.ac.uk) gives contacts for many other London chaplains of a variety of faiths. The Imperial College Student Handbook contains details of societies for specific faith groups.

London Nightline

External phone number 020 7631 0101

Helpline offering confidential listening support and information to students in London. It is run by students in the London area, every night of term, 6pm - 8am. It is also now possible to contact Nightline via e-mail: listening@london-nightline.org.uk

British Heart Foundation
http://www.bhf.org.uk/

Banks

There is a branch of the National Westminster Bank on Level 1 of the Sherfield Building.

Branches of Barclays and Royal Bank of Scotland banks can be found close to South Kensington Tube station. The station also contains an HSBC cash machine opposite the stairs to the ticket hall.

Transport for London
www.tfl.gov.uk
10. SOUTH KENSINGTON CAMPUS MAP
(A HIGH DEFINITION MAP CAN BE FOUND AT http://www3.imperial.ac.uk/campusinfo)
11. OTHER CAMPUSES

Royal Brompton Hospital (RBH) campus, Sydney St, Chelsea SW3 (nearest Tube, South Kensington): contains Seminar Rooms 1 & 2. The main entrance is on Sydney Street, opposite St Luke’s Church and gardens.

The NHLI Guy Scadding Building, which contains the Paul Wood Lecture Theatre, is behind the main hospital, located on the corner of Dovehouse Street and Cale Street, and close to the Royal Marsden Hospital.
St Mary's Hospital, Praed St, Paddington, W2 (nearest Tube, Paddington)
(Imperial College building to right of arch in photo, opposite junction with Norfolk Place)
Hammersmith Hospital campus, Du Cane Road, W12 (nearest Tube, East Acton)

(see separate PDF for map of Hammersmith).

Note that two of the crossover teaching sessions will be at Hammersmith campus, held in the Clinical Research Building (3 on the Hammersmith site PDF).