

Surgical Design, Technology and Innovation (SDTI)

Intercalated BSc 2019/20

The BSc provides an opportunity to study the way in which surgery is being radically changed by new research, and the emerging disruptive surgical technologies and innovations of the future. This course covers the process by which clinical surgical problems are identified, technological solutions are proposed, studies testing these interventions are designed, and how ultimately new technologies are implemented in a clinically safe and responsible manner.

Throughout the BSc you will develop fundamental research skills that will prepare you for the practice and improvement of modern surgery. The BSc will particularly focus upon clinical research and surgical trials.

The BSc course is split into three modules – the taught component with lectures and practicals, a guided study component and then the independent research project. Spin down to take a look at pages 7-8 for more detail but for now just remember this:

The first module '**Design**' is split into three block with each reflects an aspect of the innovation process outlined above. The first block deals with the theory of designing surgical studies or trials and how new technologies are taken through to clinical use.

This is then reinforced in the second taught block '**Technology**' where students are given the opportunity to work with the world leading clinical and non-clinical scientists at Imperial College who will present new technology case studies that are at different steps in the development process.

The final taught block '**Innovation**' will be delivered by world renowned surgical innovators who will outline some of the exciting areas that emerging surgical technologies will offer to clinicians and surgeons of the future.

In addition, a wide array of research projects will be on offer to students of this course, varying from laboratory based projects through to more clinically orientated studies, all of which will be under the guidance of the expert staff of Imperial College Department of Surgery and Cancer.

Surgical Simulation

For you to appreciate the successful impact of surgical research in clinical practice, and to inspire you to go on and make improvements yourself the BSc includes several simulations.

Suturing	- Fri 27 th Sept
Simulated ward	- Mon 4 th Nov
Wound cleaning	- Tues 26 th Nov
Pop up theatre	- Fri 29 th 2019
Laparoscopy	- Tues 3 rd Dec

During these simulations you will have the opportunity to practice key surgical skills alongside surgical trainees. Some of the sessions will include the examinations that trainees undergo to give you a feel not only for the training but also how you would be assessed.

Research Skills

The course will also provide opportunities to learn, practice and develop key research skills that will be necessary for you to develop a career in medicine.

Reading, appraising and presenting papers	- Tues 24 th Sept
Audits and ethics	- Fri 4 th Oct
Critical appraisal	- Mon 21 st Oct
Innovation and brainstorming	- Mon 25 th Nov

Assessment Briefings, Preparation and Practice

Some of these skills will be assessed during the BSc and to help guide then prepare you a number of sessions are timetabled to discuss the tasks and provide training.

Letter to the editor	- Tues 24 th Sept
Communication (videocasting)	- Fri 1 st Nov
Data analysis and abstracts	- Mon 18 th Nov
Lit review/cases	- Mon 30 th Sept
Project write up	- Mon 3 rd Feb to Fri 15 th May
Project presentation	- Mon 3 rd Feb to Fri 15 th May

Assessment Drop in Sessions/Feedback

As you will learn in the course teamwork and supporting each other is vital to becoming a successful researcher and clinician. We have also timetabled three drop in sessions to provide support for assessments and other aspects of the course you may be interested to discuss.

Letter to the editor	- Mon 7 th Oct
Videocast	- Fri 8 th Nov
Data analysis and abstracts	- Fri 6 th Dec

Surgical Research

Finally, and perhaps most importantly some of the world's best clinical researchers are taking part in the BSc and will be talking to you about research within their chosen specialities. The teaching will combine to explain the research and translation pathways and show you how the clinical and non-clinical staff at Imperial are traversing them to improve the world and making it a better place to live. *Pay attention – we expect some of you to do the same during your future careers!*

Surgical trials, design and delivery	- Tues 8 th Oct
Translation and entrepreneurship	- Fri 11 th Oct
Precision Surgery	- Tues 22 nd Oct
Urology Technology	- Fri 25 th Oct
Neurosurgery	- Tues 29 th Oct
Humans and healthcare economics	- Tues 5 th Nov
Healthcare innovation	- Tues 19 th Nov
Fracture management	- Fri 22 nd Nov
Urology innovation	- Mon 2 nd Dec

Staff Profiles

We have added some pictures to remind you to say hi if you see us about and about the college.

Director

Mr Jamie Murphy completed his medical school training at the University of St. Andrews, Harvard University and St. John's College, Cambridge. After qualification he undertook his Higher General Surgical Training at the Royal London Hospital and was awarded a PhD in Colorectal Molecular Oncology.



Deputy Director

Dr Richie Abel is a senior Lecturer in Musculoskeletal Sciences working in collaboration with clinicians, engineers and materials scientists studying what makes bone strong, how osteoporosis makes bones fragile and how treatments restore strength. Research is focussed on discovering why some people age healthily whilst others fracture, then using the knowledge to help us to find more effective tools for predicting and preventing fractures.



Module 1 Assessment Lead

Dr. Eduardo M. Normando is a clinician scientist, Senior Lecturer at Imperial College London and Consultant Ophthalmologist at the Western Eye and Charing Cross Hospitals. He is also a member of the Imperial College Ophthalmic Research Group (ICORG) Clinical Trials Unit and his research is focused mainly on innovative non-invasive retinal imaging techniques and their applications in assessing novel therapeutic strategies for ophthalmic and neurodegenerative diseases.



Module 2 Lead (Lit review)

Prof Andrea Frilling is Chair in Endocrine Surgery at Imperial College London. She is a practising consultant surgeon with an interest in the translation of basic medical research findings into the clinical setting.



Module 2 Lead (Cases)

Miss. Di Marco is a Consultant Endocrine Surgeon at Imperial College NHS Trust and an Honorary Senior Lecturer, performing neck endocrine and adrenal surgery. She was awarded the medal for the highest scoring candidate in the FRCS. Her research interests include surgical technology (on which she undertook her PhD) the appraisal of novel technology in endocrine surgery and endocrine surgical pathology in women of reproductive age.



Module 3 Lead (Projects)

Dr Paul Strutton is a Senior Lecturer in Neurophysiology and runs the Nick Davey Laboratory within the His research interests include investigation of the brain control of movement using transcranial magnetic stimulation under normal and pathological conditions such as low back pain, spinal cord injury and fatigue.



Module 3 (projects)

Mr Gareth Jones is a consultant knee & trauma surgeon, and clinical senior lecturer, researching in personalised orthopaedics, assistive technology and AI. Completed the Imperial BSc in Physiology.



Education Administrator

Tyson Harcombe is the Course Administrator for the BSc in Surgical Design, Technology and Innovation based at St Mary's.



Staff Contact Details

Here are our contact details for when you need to get in touch. We don't bite and we want to support and empower you all to do well. If you do have a question tell us your thinking and explain what you think the answer might be so we don't just feel like we are doing all the work for you.

Role	Name	Title	Email
Director	Mr Jamie Murphy	Consultant Colorectal Surgeon	jamie.murphy@imperial.ac.uk
Deputy Director	Dr Richie Abel	Snr Lecturer in Musculoskeletal Sci	richard.abel@imperial.ac.uk
Module 1 Lead	Dr Richie Abel	Snr Lecturer in Musculoskeletal Sci	richard.abel@imperial.ac.uk
Module 1 Assessment Lead	Eduardo Maria Normando	Consultant Ophthalmologist and Clinical Snr Lecturer	e.normando@imperial.ac.uk
Module 2 Lead (Lit review)	Prof Andrea Frilling	Chair in Endocrine Surgery	a.frilling@imperial.ac.uk
Module 2 (Case Studies)	Miss Aimee di Marco	Research Postgraduate	a.di-marco@imperial.ac.uk
Module 3 Lead	Dr Paul Strutton	Senior Lecturer in Neurophysiology	p.strutton@imperial.ac.uk
Module 3	Mr Gareth Jones	Clinical Snr Lecturer in Orthopaedics	g.g.jones@imperial.ac.uk
Administration	Alison Cambrey	Education Manager	a.frilling@imperial.ac.uk
	Tyson Harcombe	Education Administrator	t.harcombe@imperial.ac.uk

Learning Outcomes

These are your friends that will guide you through the course. Practice each one and discuss among yourselves when they pop up in the course. Take extra special care to keep an eye out for the outcomes in blue.

Professional Values and Behaviours

1. Understand and uphold the principles and ethics of academic integrity and quality
2. Maintain curiosity and thoughtfulness and be prepared to question “accepted” facts and theories
3. Demonstrate effective team and individual work

Professional Skills

4. Manage, analyse and interpret research data, quantitative and qualitative evidence
5. Critically appraise the strengths and weaknesses of research work
6. Integrate different types of information and knowledge to justify a point of view
7. Design a robust study plan to address a research question
8. Communicate research effectively to a range of audiences

Professional Knowledge

9. Demonstrate the understanding of the research pathway, including the rationale, characteristics and limitations of different research approaches
10. Demonstrate an understanding of the translation of research to the clinical forum as well as the application of an informed approach to patient care

Surgery

11. Demonstrate an in-depth understanding of the chosen BSc subject:
12. Understand how surgical devices are developed from being prototypes through to the point of being ready for clinical use
13. Demonstrate an understanding of the challenges when implementing new surgical techniques and the processes necessary for these to be introduced safely into clinical practice
14. Understand how analysis of long-term patient outcome data can lead to improved or personalised treatments for surgical patients

Timetable and Assessment Overview

The taught component structure consists of a 12-week teaching block interspersed with consolidation weeks where students can commit to associated self-directed learning, on-line modules, group work etc, and will also provide an opportunity to meet with the course lead to discuss progress, issues, and to receive feedback on course work and progression.

Scheduled Learning & Teaching

- Core skills-based curriculum
- Dynamic interactive teaching with blended materials
- Small group teaching (seminars, tutorials, debates, team-based learning, journal club, discussions)
- Laboratory practical's
- Clinical demonstrations
- Technology enhanced learning

Module 1 Assessments (taught component)

Mon 23rd Sept – Fri 13th Dec 2019

There will be 3 in-course assessments during the taught component, each with a formative assessment.

Written (15%)

Letter to the Editor of a journal addressing a topic within their specialty field (1000 words max) and in Lancet Comment style. Figures and tables are not permitted. Examples of acceptable articles could include also: a topical or controversial paper in the field and a report of a major clinical study

Oral (15%)

Oral Presentation: Video cast addressing either two conditions, or presentations, or underlying mechanisms within the field and identify similarities and differences in; for example, the (patho)physiologies, or the evidence for diagnoses, treatments and/or prognoses. Alternatively Identify a contentious topic in a surgical specialty that has not reached consensus.

Data Management (70%)

- **Results Compendium: 50%:** (max 7 single figures/tables, and 1500 words max): Students will process, analyse, present and discuss their results.
- **Scientific Abstract: 25%:** (350 words max): the following format should be followed: Background, Aim/Hypothesis, Methods (incl. stats), Results, Discussion/Conclusions, References
- **Lay summary: 25%:** (500 words max): (e.g.: a magazine/ newspaper article) Students will write a summary of their findings having in mind a non-scientific audience, keeping a good balance between factual and anecdotal style and taking care not to overstate conclusions.

Module 2 Assessments (self-study component)

Mon 6 Jan - Fri 31 Jan 2020

There are 2 in-course assessments during the self-directed component, linked to learning outcomes in research skills and surgical knowledge. You will participate in a group task to produce a literature review article within surgery. As well as an individual 'Science in Context' clinical case study will form your second in-course assessment during this module. These two tasks will be completed simultaneously

Group Literature Review (15%)

As part of a group you will undertake a critical review of the literature under supervision from a clinical researcher. After completing the review your team will peer review another teams paper – while they review yours. Afterwards you will be able to write a rebuttal. This will be good practice for submitting grants and publishing papers during your career.

Clinical Science in Context (10%)

An individual task where you will write a clinical case study for a patient. You will meet the patient in groups and the report must be written and prepared on your own. The study can cover emerging evidence and guidelines as well as information from patient contact and surgical experts.

Module 2 Preparation

Both the lit review and cases tasks will be explained and discussed in detail on Monday 30th September 2019, with skills training.

Module 3 Research Project (independent component)

Mon 3 Feb – Fri 15th May 2020

You will undertake a 12- week research project under supervision. This module is largely self-directed learning, and you will be supported by academic skills workshops as well as welfare checks. You are also encouraged to also take part in local lab meetings with your supervisory groups.

You will write up their project work in the style of a research paper and also give an oral presentation reflecting on your individual research journey and future research directions.

Research Paper (35%)

Project write-up as a paper following author guidelines from a journal in the field.

Oral Presentation (10%)

Project presentation also including the individual research journey.

That's all folks!

Good luck, enjoy and don't stress. If your worried about assessments just stop and remember that clinical training is a long game and that one day you will get to transform people lives. Which when you think about it is pretty amazing.