Imperial College London

Biomedical Science BSc

Imperial College London is one of the foremost centres for both teaching and research in the Biomedical Sciences in Britain. The Faculty of Medicine is one of Europe’s largest medical institutions, and provides the opportunity to specialise in topics of particular interest as the course progresses. The Department of Life Sciences encompasses a wide range of research, much of which is of direct relevance to medicine. The wide specialist experience of the academic and research staff is fully used in teaching, in the extensive tutorial system and in the supervision of undergraduates and postgraduates.
Biomedical Science encompasses the principles and practice of biology and biochemistry in relation to medicine. The degree programme at Imperial College London is an exciting collaboration between the Department of Life Sciences and the Faculty of Medicine (one of Europe’s largest medical institutions).

Students follow a 3-year course, leading to a Biomedical Science BSc degree (B900) which offers excellent opportunities and is particularly attractive to those considering a career in research or postgraduate Medicine.

The programme provides students with a sound knowledge and understanding of the principles and practice of biomedical science. After choosing their specialist options, students are able to take advantage of the diverse array of expertise in biomedical science and related disciplines available within the College and can tailor their path of study to their career expectations and ambitions.

Throughout the course students will have world-class teaching, research and development opportunities. Graduates will have developed the knowledge, analytical skills and professional attitudes necessary to establish and further their careers in the dynamic world of the workplace in the 21st century. They will be qualified to pursue a wide variety of careers, including entry into graduate medicine, biomedical research, the pharmaceutical industry, scientific journalism and healthcare management, amongst many others.

Teaching for the first two years of the course is based mainly in the Sir Alexander Fleming Building at the South Kensington campus and in the Commonwealth Building at the Hammersmith Hospital campus in West London. Both campuses have excellent purpose-built facilities with the latest technology for learning biomedical science in the 21st century. They also have well-equipped teaching laboratories and computer suites, an extensive IT network for supporting computer-assisted learning and first-class library facilities.

Course structure

All students follow a core programme in Years 1 and 2. In Year 1 the core course covers fundamental topics in biomedical science, including molecular and cellular biology, biological chemistry and human biology. In Year 2 further core teaching introduces the concepts of the pathophysiology and treatment of disease and of research methodology. Throughout there is an emphasis on practical and project work and on the development of independent thinking and critical analysis. Students will also participate in the diverse Humanities programme run by Imperial College London.

First Year

In the first week there is an induction course designed to help the students adjust to College life and to the teaching methods they will experience. It includes sessions on study skills, information technology and use of the library. Thereafter students take the following courses:

- **Cell Biology** – molecular and cell biology, genetics, developmental biology, immunology, virology
- **Biological Chemistry** – organic chemistry, structure and function of biopolymers, thermodynamics, enzymology, synthesis, membrane structure and function, metabolism and catabolism
- **Human Biology** – anatomy, system biology (musculoskeletal, nervous, haematology, cardio-pulmonary, renal-hepatic, gastro-intestinal), neuroscience and special senses, endocrinology and metabolism, human behaviour, reproduction, embryology, development and ageing
- **Animal Behaviour**
- **Bacteriology**

In addition, tutorials in chemistry, mathematics and statistics are integrated into the course.
Second Year

Students take the courses outlined below, which include a tutored dissertation for which time is allocated in the programme of study.

- **Applied Molecular Biology** (including bioinformatics)
- **Human Pathophysiology and Disease** – includes pharmacology, epidemiology, imaging, ethics and law in biomedical research, carcinogenesis and cancer biology, human disease and its treatment with options for project work
- **Statistics and Computing in the Life Sciences**
- **Immunology**
- **Parasitology or Genetics**
- **Dissertation on a biomedical topic**

Final Year

**PATHWAY 1**

**Part 1** (Autumn Term and First Half of Spring Term)

Students can select one of the following (15-week) topics for specialist study from the MBBS/BSc degree programme for Medical students.

- **Cardiovascular Sciences** - This course will provide students with an understanding of the basic biological processes that are involved in the development and treatment of cardiovascular disease and with many of the methodologies for investigating cardiovascular disease (including epidemiological studies).
- **Endocrinology** - This course explores the endocrine system as a critical means of communication within the body and how it maintains a constant internal milieu in the face of an ever-changing external environment. Its essential role in survival and adaptation throughout life and in the balance between health and disease will be examined.
- **Gastroenterology and Hepatology** - This course allows a science based study of the gastrointestinal tract and liver in health and disease. Diagnostic and therapeutic principles, with the emphasis on the science underlying imaging and neoplasia, gene-environmental interactions, including metabolic, genetic and nutritional disorders, and infective, immunological and inflammatory mechanisms as applied to the gastrointestinal tract and liver will be studied.
- **Haematology** - This course is directed at students who have an interest in the scientific basis of medical practice and provides them with an understanding of the scientific method and of the scientific basis of haematology. While directed particularly at students with an interest in the blood and its disorders, it also provides generic skills and provides transferable knowledge that can be readily applied to other disciplines.

- **Immunity and Infection** - This course allows a science-based study of the immune system in health and disease, in particular that caused by infectious organisms. Building upon an understanding of the basic mechanisms underpinning microbial pathogenesis, immune activation, tolerance, inflammation and repair, the course will cover immune evasion, vaccination, immune-mediated damage, autoimmunity and the immunological aspects of transplantation.
- **Neuroscience and Mental Health** - Students will be taught how this multidisciplinary subject extends from a molecular level, through the assembly of the basic structures of communication (e.g. synapse) to the complex organisation of the central nervous system and its multitude of motor, sensory and cognitive behaviours.
- **Reproductive and Developmental Science** - This course includes all aspects of human reproductive and developmental biology, addressing them from the perspective of the fundamental mechanisms that control these normal physiological processes, and then considering our current knowledge of the most important pathologies. This will also be from the perspective of the fundamental biology of processes, rather than treatment options. The latter will be considered in selected cases, providing examples of how improved knowledge leads to improved treatment.
- **Surgery and Anaesthesia** – This course provides an insight into the fundamental scientific principles underlying modern surgery and anaesthesia. Students will become familiar with bioengineering and technological advances in clinical practice, molecular mechanisms and applied pharmacology of anaesthesia and analgesia, principles of tissue regeneration and repair in cancer surgery, and inflammation, immunity and infection in the peri-operative environment.

Alternatively a combination of three Final Year BSc (5-week) modules from the Biochemistry and Biology degree programmes may be taken from the following areas:

- Cell signalling and protein sorting
- Advanced topics in parasitology & vector biology
- Cellular signalling & neurobiology
- Damage and repair in biological systems
- Cellular neuroscience
- Epidemiology
- Genetics and genomics
- Integrative systems biology
- Medical glycobiology
- Medical microbiology
- Mechanisms of gene expression
- Molecular basis of development
- Molecular neurobiology
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In the first week there is an induction course designed to help the students adjust to College life and to the teaching methods they will experience. It includes sessions on study skills, information technology and use of the library. Tutorials in chemistry, mathematics and statistics are also integrated into the First Year.

**FIRST YEAR**
- Cell Biology
- Biological Chemistry
- Human Biology
- Animal Behaviour
- Bacteriology

**SECOND YEAR**
- Applied Molecular Biology
- Human Pathophysiology and Disease
- Statistics and Computing in the Life Sciences
- Immunology
- Parasitology OR Genetics
- Dissertation on a Biomedical subject
- Supplementary Course: (Humanities / Languages / Management)

**FINAL YEAR Pathway 1**
**PART ONE**
- (Autumn Term and first half of Spring Term)
- Students select either one 15-week topic from the MBBS/BSc Medicine programme or three 5-week Final Year BSc modules from the Biochemistry and Biology degree programmes.

**15-Week Medicine Topics**
- Cardiovascular Sciences
- Endocrinology
- Gastroenterology and Hepatology
- Haematology
- Immunity and Infection
- Neuroscience and Mental Health
- Reproductive and Developmental Science
- Surgery and Anaesthesia

**5-Week Biochemistry Modules**
- Cell signalling and protein sorting
- Advanced topics in parasitology & vector biology
- Cellular signalling & neurobiology
- Damage and repair in biological systems
- Cellular neuroscience
- Epidemiology
- Genetics and genomics
- Integrative systems biology
- Medical glycomics
- Medical microbiology
- Mechanisms of gene expression
- Molecular basis of development
- Molecular neurobiology

**FINAL YEAR Pathway 1**
**PART TWO**
- (Second half of Spring Term and Summer Term)
- Students select one of the following three options:

**Independent Full-Time Research Project**

**ONE 5-Week Biochemistry or Biology Module**
- Advanced Topics in Molecular, Cell and Immunobiology
- Advanced Topics in Neuroscience Research
- Biochemical Pharmacology and Drug Action
- Biotechnology and Business
- Molecular Basis of Bacterial Infection
- Synthetic Biology

**Taught Modules in either:**
- Medical Humanities
- History of Medicine
- Global and Environmental Health

**FINAL YEAR Pathway 2**
**Management and Health**
- (run by Tanaka Business School):
- This is a full year programme consisting of core courses in the Autumn Term and Spring Term and a group project undertaken in the Summer Term. The course provides a basic foundation in all the core management areas with an emphasis on the medical and pharma sectors.

**Autumn Term**
- Organisational Behaviour
- and Human Resource Management
- Marketing
- Health Service Research
- Health Informatics
- Accounting

**Spring Term**
- Managing Healthcare Organisations
- Health Economics
- Business Strategy
- Entrepreneurship
- Project Management

**Summer Term**
- Group Project
Final Year

PATHWAY 1

Part 2 (Second Half of Spring Term and Summer Term)

Students take one of the following three options:

1) An independent full-time research project in the latter part of the Spring Term and the Summer Term.

2) A single Biochemistry or Biology (5-week) module from the following areas:
   - Advanced topics in molecular, cell & immunobiology
   - Advanced topics in neuroscience research
   - Biochemical pharmacology and drug action
   - Biotechnology and business
   - Molecular basis of bacterial infection
   - Synthetic biology

   This would be followed by a shorter research project in the Summer Term.

3) Students not wishing to pursue options 1 or 2 would take a further series of taught modules in one of the following areas:
   - Medical Humanities
   - History of Medicine
   - Global and Environmental Health

PATHWAY 2

Management and Health (run by Tanaka Business School):

This is a full year programme consisting of core courses in the Autumn Term and Spring Term and a group project undertaken in the Summer Term. The course provides a basic foundation in all the core management areas with an emphasis on the medical and pharma sectors. The Autumn Term courses are: Organisational Behaviour and Human Resource Management; Marketing; Health Service Research; Health Informatics; Accounting. The Spring Term courses are: Managing Healthcare Organisations; Health Economics; Strategy; Entrepreneurship; Project Management.

Entry requirements

Minimum entry requirements AAA at A2 with B at AS level. These must include Chemistry and Biology, and preferably Mathematics, at A2. Mathematics required to at least B at AS if not offered at A2. Candidates who have taken Mathematics at A2 are required to obtain a B in another AS level. Applicants offering pre-2002 qualifications will be required to have grades AAA in A level Chemistry, Biology and a third subject. General studies will not be accepted at any level. All applicants must have the following subjects at GCSE level, at grades AAABB or above (in any order): Biology (or Human Biology), Chemistry, English Language, Mathematics (or additional mathematics or statistics), and Physics. The science double award may substitute all sciences at GCSE level and must be at grade A. Grade 7.0 in IELTS with 7.0 in all elements acceptable in place of GCSE English Language. For International Baccalaureate we ask for 38 overall with grade 6 in Chemistry and grade 6 in Biology, both required at Higher level, and Grade 5 in Standard level English.

All candidates applying for the Biomedical Science BSc must take the BioMedical Admissions Test (BMAT). Please refer to the BMAT website at www.bmat.org.uk/index.html for key dates and additional information. We also accept many other non-standard qualifications. For the full list of possible entry qualifications please see our UCAS entry or visit our website at http://www3.imperial.ac.uk/naturalsciences/courses/ug/

Contacts and links

The College and Faculty Web sites are the major sources for up-to-date information. Please visit regularly for updates.

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Useful web sites

College web site: http://www.imperial.ac.uk/
Undergraduate prospectus: http://www3.imperial.ac.uk/ugprospectus
Visiting Imperial: http://www3.imperial.ac.uk/ugprospectus/visitimperial

For further information on courses offered by the Faculty of Natural Sciences and our specific admission criteria please go to:
http://www3.imperial.ac.uk/naturalsciences/courses/ug/

For further information on courses offered by the Faculty of Medicine please go to:
http://www1.imperial.ac.uk/medicine/teaching/undergraduate/
Enquiries about our courses should be directed to the relevant Admissions Tutor. Further information on the courses offered at Imperial and the most up-to-date information can be found online at www.imperial.ac.uk/ugprospectus

For general information please contact the College switchboard on +44 (0) 20 7589 5111

For general admission enquiries and information about fee status, visas, etc please visit www.imperial.ac.uk/registry/enquiries

or write to:

Registry
Imperial College London
South Kensington Campus
London
SW7 2AZ
UK

Alternatively you can contact our Registry by phone:
+44 (0) 20 7594 8001

Printed copies of our prospectus can be ordered at www.imperial.ac.uk/prospectus