BSc Medical Biosciences: a fully flipped undergraduate programme underpinned by experiential learning

Ana P. Costa-Pereira
“Education should prepare young people for jobs that do not yet exist, using technologies that have not yet been invented, to solve problems of which we are not yet aware.”

Richard Riley, 2004

Former United States Secretary of Education
BSc Medical Biosciences - development

• Design: 1st phase 2015; 2nd phase 2017-2018

• Extensive consultation
  * ~60 Imperial Academics
  * ~12 European and overseas Research Leaders
  * 9 pharmaceutical organisations
  * ~250 school students
  * ~20 UG & PG Imperial Students
  * Student Union

• Recruitment
  TFs January 2016-2018; Academics Spring 2016-2018; IDs Winter 2016/Spring 2017

• Launched October 2017
BSc Medical Biosciences - our ethos

• Focus on great health challenges of the 21st Century and our research strengths

• Employs a truly hands-on approach facilitated by innovative **Lab Pods** & 20 week long final year projects = extensive research training programme

• Interactive, collaborative and deeply practical learning methods, suited to today’s students (Y1 & Y2 ‘flipped’)

• Networking at the heart of Medical Biosciences
Bespoke BlackBoard

BSc Medical Biosciences

Student Home

Getting Started with Blackboard

- To access taught material, complete activities and view your progress, click the Programme link:
  e.g. 2018-2019 - Year 1 BSc Medical Biosciences
- To view additional support information and resources to help you during your time in College, click the appropriate link below the Programme link. The A-Z Directory in particular is a useful place to start as it has an alphabetically organised list of links covering a wide range of topics.
- The Announcements tool on the right will display news and information related to Blackboard, the Programme and the Modules. Please check this regularly.

Programmes and Information

Organisations where you are: Leader
2017-2018 - Year 1 BSc Medical Biosciences
2018-2019 - Year 1 BSc Medical Biosciences
2018-2019 - Year 2 BSc Medical Biosciences
Organisations where you are: Participant
A – Z Directory
Blackboard Support
Library and Information Skills
Notice Board
Announcements:

Announcements

No Institution Announcements have been posted in the last 7 days.

Genetics and Genomics (GEN)
- GEN ICA - Track Changes on Word Template
Molecular and Cellular Biology (MCB)
- Results of the Microscopy of Blood Cells Practical.
- MCB10 Student Generated Quiz Report - now available
Notice Board
- Christmas Lecture - Professor Sir Paul Nurse
  more announcements...
From basic concepts to creating something new

Y1:
Fundamental Human Biology
- 5 core modules

Y2:
The Molecular Basis of Disease
- 3 core modules
- 4/6 elective modules

Y3:
Science in Action
- 3/9 elective modules
- 1/3 elective project pathways

± Y4:
Management
Why no lectures?

TRADITIONAL
- Lecture
- Homework activities

FLIPPED
- Lecture
- Classroom activities

Flipped Classroom
- Active Learning: You will take part in a variety of interactive online and face-to-face activities
- Deep Learning: You will learn through practical problem-solving activities which help with knowledge retention
- Collaboration: You will develop collaboration skills through classroom-based group work and discussions
- Feedback: You will receive immediate feedback on your progress through interactive quizzes and activities

Higher retention of knowledge, for longer periods of time
Typical week of a Year 1 BMB student

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<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
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<tbody>
<tr>
<td>Lab Pod I (includes lunch break)</td>
<td>Module 1 Guided self-study (e.g. e-learning session)</td>
<td>Guided self-study (e.g. e-learning session)</td>
<td>Module 2 Guided self-study (e.g. e-learning session)</td>
<td>Lab Pod preparation (e.g. e-learning lab simulation, experiment planning and write-up)</td>
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<td>09:00</td>
<td>Module 1 Face-to-face class (e.g. Flipped lecture)</td>
<td>Extra-curricular activities</td>
<td>Module 2 Face-to-face class (e.g. Flipped lecture)</td>
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In a **blended environment**, learning time does not equate to the number of hours spent in sessions.

**Learning time** = time spent in F2F sessions + time spent on-line working with the eModules
Overview of session

In September 1971, an extraordinary little boy was born in Houston, Texas, USA. His name was David Phillip Vetter and he was born without a functional immune system. He suffered from what is referred to as X-linked severe combined immunodeficiency (SCID), a congenital disease that leads to an individual having no T cells, no NK
Students welcomed in a pop-up planetarium
Lab Pod: where magic happens...
The Lab Pods

- Run like a real research lab
- Hypothesis-driven research project
- 1 day per week throughout the academic year
- Focus on scientific rigour and the mastering of basic biomedical research techniques
- Analytical and transferable skills
Lab Pod: where magic happens...
Lab Pod: where magic happens...
Getting ‘those’ skills...
Lessons learnt

• Flipping a lecture is hard work! (but ever so rewarding)

• Learning spaces are critical

• Support staff to configure rooms a real need

• It’s a team effort!

• Once you flip, there is no going back!
Acknowledgments

**BMB Teaching Fellows (past & present)**
- Charlotte Clark (2016-2018)
- Kirsty Flower (2016-)
- Luisa Garcia-Haro (2017-)
- Jacqueline Dickson (2018-)
- Laura Collopy (2018-)
- Alwyn Dart (2018)

**Instructional Designers (IDs)**
- Agata Sadza
- Emma Blyth

**Learning Technologists (LTs)**
- Adrian Cowell
- Akram Ameen

**Martin Lupton** Vice Dean (Education) & Head of Undergraduate Medicine
**Alison McGregor** Director of Undergraduate Science
**Sue English** Director of Education Management & Programme Director
**Lisa Carrier** Head of Technology Enhanced Education
**Michele Foot** Learning Resources and Technical Services Manager

**Programmes Team**
- Alyeisha Joseph
- Chris Harris
- Nicole Harbert
- Sharon Hubscher

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- Mike Barratt
- Teaching labs staff
- Tom Conway

**Development Team**
- Flo Page
- Gerry Greyling
- Josh Blacker (2018-)
- Rumi Khanom
Thank you to all dedicated BMB academics!

Head of Y1: Jacqueline Dickson
- MCB (core)
  - Birgit Leitinger
  - Peter Clark
  - Silvia Ottaviani
  - Laura Collopy
- CBI (core)
  - Toby Athersuch
  - Luisa Garcia-Haro
- INTS (core)
  - Paul Strutton
  - Kevin Murphy
  - Letizia Foroni
  - Alwyn Dart
- STAT (core)
  - Kirsty Flower
  - Enrica Papi
- LP1 (core)
  - BMB TFs

Head of Y2: Liz Want
- GEN (core)
  - Andy Porter
  - Ed Curry
- CBIO (core)
  - Charlotte Bevan
  - Anabel Varela Carver
  - Jacqueline Dickson
- PHAR (elective)
  - Chris John
  - Toby Athersuch
- SCRB (elective)
  - Harry Leitch
  - Mark Sullivan
- MHD (elective)
  - Jia Li
  - Jonathan Swann
- IMI (elective)
  - Ana Costa-Pereira
  - Rob White
  - Manuela Mura
- NEURO (elective)
  - Laura Canevari
  - Sam Hughes
- CTB (elective)
  - Duncan Rogers
  - Beata Wojciak-Stohard
- LP2 (core)
  - BMB TFs

Head of Student Admissions
- Peter Clark

Head of Assessment & Feedback
- Birgit Leitinger

Senior Welfare Tutor
- Rebecca Salter

Head of Y3: Kirsty Flower

We are recruiting Module Leads now!

https://bb.imperial.ac.uk/bbcswebdav/xid-4793241_1
Y1 (theoretical modules fully flipped)

- Fundamental Human Biology
  - eLearning (on-line)
  - Collaborative learning (face-to-face)
  - Guest lectures (face-to-face)

- Lab Pod I
  - Core practical module
  - Research project
  - Skills
  - 8 hours/week (October-June)

4 core interactive modules

- Molecular & Cellular Biology
- Chemistry Biological Interactions
- Integrative Body Systems
- Statistics
Y2 (theoretical modules fully flipped)

2 core modules
- Genetics & Genomics
- Cancer Biology

The Molecular Basis of Disease

Lab Pod II
- Core practical module
- Research project
- Skills
- 8 hours/week (October-June)

Choose 4 out of 6 interactive elective modules
- Immunology & Inflammation
- Neuroscience
- Microbiome in Health & Disease
- Cardio-Vascular & Thoracic Biology
- Pharmacology
- Stem Cells & Reproductive Biology
Y3 (seminars and project)

Choose 3 out of 9 pathways

Science in Action

Project

Laboratory-based research project
Literature-based research project
Work placement-based project

Nano technology
Precision Medicine
Obesity & Diabetes
Biology of Ageing
Targeting Antimicrobial Resistance
Regenerative Medicine
Designing Drugs for the 21st century
Global Health
Science Comm. & Public Engagement

Creative Reflection
Science Comm. & Public Engagement 2

Students choosing a literature-based research project or work placement-based research project will also take these two modules.