Biomedical Sciences at Bristol

Dr Keith Brown, Programme Director

bristol.ac.uk/ug20-biomedical
BSc Biomedical Sciences

- Introduced in 2017

- The first year will allow you to gain a better understanding of all the biomedical subjects on offer

- Then follow your interests as they develop in the next two years:
  - Cells and Molecules pathway
  - Systems pathway
  - Molecules and Systems pathway

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## Year 1 BSc Biomedical Sciences

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Teaching methods

Bristol is a research-intensive university and your learning and teaching will be research-led.

- lectures
- workshops and tutorials
- laboratory practicals
- supported by online dynamic laboratory manual
Capture ELISA

During this practical you will be using a capture ELISA to assay the concentration of IgM in a serum sample. The assay process is slightly different to the one demonstrated last week.

A serum sample is a complex mix of antigens and a capture ELISA increases specificity. An animation of the capture process is shown below:

A capture or sandwich ELISA is used to detect immunoglobulin or antigens in serum or derived from infectious agents. A known quantity of the primary antibody has already been adsorbed to the walls of the ELISA plate below and any unbound antibody removed using washing buffer.

The ELISA plate you will be provided with during this practical has already been coated with anti-IgM antibodies, washed thoroughly and blocked with blocking serum albumin (BSA). BSA is used to cover any remaining surface of the plastic to prevent non-specific binding. For example, if blocker was not
Streak plate technique

Sterilise the loop
Add loop of culture to plate
Streaking the remaining quadrants

Hold the loop in one hand and the culture bottle in the other. Open the culture, keeping hold of the lid, and pass the lip of the bottle through the flame to sterilise (not shown here). Dip the loop into the culture after it has cooled down and replace the lid. Streak your sample onto your agar plate, replace the lid immediately and resterilise the loop.
Introduction

When working with bacteria in a laboratory, it is essential that you know or can verify which bacterial species has been isolated. This is extremely important in medical microbiology where misidentification could mean the difference between life and death.

When a patient has a suspected bacterial infection, the doctor will prescribe a broad-spectrum antibiotic in order to cover a range of options. However, once the microbe has been identified the doctor may switch treatment to a more appropriate narrow range drug, especially if the patient is in hospital, to avoid favouring the emergence of broad spectrum resistance. Therefore, the importance of identifying the causative microbe (and its antibiotic resistance as you will see in subsequent practicals) cannot be overemphasized.

Clinical importance of identifying bacteria

Bacterial identification involves tests and observations of various kinds. You may have met some of these in previous practicals both in this unit and in 'Introduction to Microbiology' including colony morphology, microscopic examination with and without staining, biochemical tests and agglutination tests. More recently, DNA tests using hybridization and polymerase chain reaction (PCR) are also being used.
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**Cells and Molecules Pathway**

**Systems Pathway**

**Molecules and Systems Pathway**

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**Cells and Molecules Pathway**
## Years 2 and 3: Cells and Molecules Pathway

### Year 2
- BREES
  - Recombinant DNA Technology
- Molecular Cell Biology
- Gene Expression & Rearrangement
- Infection and Immunity
- Cellular & Molecular Pathology

### Year 3
- Research skills
  - Advanced Cell Biology
  - Cellular Information
  - Advanced Immunology
  - Immunopathology & Applied Immunology
  - Medical Microbiology
  - Medical Virology
  - Frontiers in Infectious Diseases
  - Developmental Genetics and Embryonal Cancers
  - Cancer Mechanisms and Therapeutics
  - Regenerative Medicine
  - Haemopoietic Stem Cell Transplantation
  - Clinical Pathology in Action

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**Systems Pathway**

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Years 2 and 3: Systems Pathway

YEAR 2

BREES

Recombinant DNA Technology

Integrative Physiology

Neurophysiology

YEAR 3

Research skills

Concepts and Skills

The Heart in Health and Disease
Physiology of the Urinary Tract
Cardiovascular System in Health and Disease
Synaptic Plasticity
The Rhythms of Life
New Horizons in Medicine
Neuroscience of Pain
Synaptic Cell Biology
Brain and Behaviour
Neurological and Psychiatric Disorders
Pharmacology of Ion Channels and Synaptic Transmission
Receptor Signalling and non-drug Therapy
Pharmacology of the Nervous System

Any three

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Molecules and Systems Pathway
## Years 2 and 3: Molecules and Systems

### Year 2
- BREES
- Recombinant DNA Technology
- Molecular Cell Biology
- Neurophysiology

### Year 3
- Research skills
- Advanced Cell Biology
- Concepts and Skills
  - Synaptic Plasticity (Block 1)
  - The Rhythms of Life (Block 1)
  - New Horizons in Medicine (Block 2)
  - Neuroscience of Pain (Block 2)
  - Synaptic Cell Biology (Block 2)
  - Brain and Behaviour (Block 3)
  - Neurological and Psychiatric Disorders (Block 3)

Any two from:
- Pharmacology of Ion Channels and Synaptic Transmission (Block 1)
- Receptor Signalling and non-drug Therapy (Block 2)
- Pharmacology of the Nervous System (Block 3)

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Biomedical sciences pathways

Year 1
- All students do the same units

Year 2
- Three pathways to choose from:
  - Cells and Molecules, Systems, Molecules and Systems
- Recombinant DNA technology and Biomedical Research, Employability and Enterprise Skills (BREES) are compulsory units
- “Gateway” units are essential for each pathway
- Recommend optional units give the best preparation for the final year
  - Can be replaced with other units e.g. Modern Language

Year 3
- All students do a research project (in “Research Skills”)
- Four lecture units are taken from a wide choice
Year 3 research projects

A wide variety of projects types will be available:

- laboratory
- bioinformatics
- literature-based
- school-based education projects
Research-led teaching

Benefit from excellent facilities:

- high fidelity human patient simulator
- virtual microscope
- flow cytometry
- imaging
Students gaining experience

UK Summer internships

Wellcome Trust vacation studentship

- Kainate receptors and hippocampal epileptogenesis

Physiological Society summer vacation studentships

- Effect of intracellular acidosis on hERG channels incorporating the 1b isoform
- Cerebellar - periaqueductal grey interactions during fear conditioning
Students gaining experience

- Singapore Agency of Science, Technology and Research A*
- Summer scholarship for two months
- Stem cell differentiation

Tom Sharrock

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Students gaining experience

- Okinawa Institute of Science and Technology, Japan
- Summer internship for two months
- Autoimmune disease biology

“The course has opened more doors than I could have ever imagined”
Emma Adams

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Students gaining experience

- Chinese University of Hong Kong
- Summer Undergraduate Research Programme
- Mechanism of anticancer action of epigallocatechin gallate (EGCG) found in green tea

“The employability strand of BREES has provided me endless support on how to make my applications stand out and has also given me the confidence I need during interviews.”

Rachel Wang
Students gaining experience

- Norwegian University of Science and Technology
- Trondheim, Norway
- Summer Intern / Lab Assistant
- Dept. of Cancer Research and Molecular Medicine

“I gained valuable laboratory experience including Western blotting for biomarker identification, FACS analysis, maintaining cell cultures and assisted with a mouse model of metastatic lung cancer.” Sophie Rovers

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Students gaining experience

- Cancer Research UK
- Summer Internship for 8 weeks
- CRUK Project Management Office
- Responsible for communications

“I had a great time working for CRUK and have now applied for one of the Grad schemes at CRUK.” Katie Issott

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Career prospects

Biomedical Sciences QAA Subject Benchmark Statement 2019

“The employment market for graduates in the biomedical sciences is buoyant. A biomedical sciences degree is considered as an excellent basis for a wide variety of future graduate-entry career paths”
Career prospects

High Fliers report 2020

The University of Bristol is in the top five universities targeted by top employers for the fifth year in a row
Career prospects

- Some graduates from biomedical sciences go on to PhD studentships as a first step in a research career

- Some go into other postgraduate degrees:
  - MSc degrees in a wide range of subjects
  - Cancer biology, clinical neuroscience, exercise physiology, immunology, virology, science communication, management
  - Postgraduate Certificate in Education (PGCE)
  - Medicine or dentistry

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Recent alumni careers evening – fields of work

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<th>Going into Industry</th>
<th>Senior Site Intelligence and Activation Team Manager, PPD Pharmaceutical Product Development</th>
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</thead>
<tbody>
<tr>
<td>Outreach &amp; Communications</td>
<td>Management Consultant, Adventis Consulting</td>
</tr>
<tr>
<td>Teaching &amp; Research</td>
<td>Freelance TV presenter and wildlife film maker</td>
</tr>
<tr>
<td>Teaching &amp; Research</td>
<td>Project Manager, The National Coordinating Centre for Public Engagement (NCCPE)</td>
</tr>
<tr>
<td>Teaching &amp; Research</td>
<td>Senior Lecturer, University of Bristol</td>
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<tr>
<td>Teaching &amp; Research</td>
<td>PhD Student, Nottingham Trent University</td>
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<tr>
<td>Teaching &amp; Research</td>
<td>Professor in Psychopharmacology, University of Bristol</td>
</tr>
<tr>
<td>Teaching &amp; Research</td>
<td>PhD in Clinical Neuroscience - Brain Tumour Research Group, University of Bristol</td>
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Recent alumni careers evening – fields of work

- Biotechnology
  - Medicine
  - Business & Communications
  - Data Analysis
  - Enterprise & Self-Employment

- CEO, Cytox Ltd.
  - Medical Student, University of Bristol
  - Medical Student, University of Bristol
  - Medical Student, University of Bristol
  - Director, NetworkPharma Ltd
  - Consultant Analyst, Adventis Consulting
  - Technical Manager, Onescientific
  - Epidemiologist, University of Oxford
  - Enterprise Adviser, University of Bristol
  - CEO, Hire Window
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<tr>
<td>Science Communication</td>
<td>Digital Content Creator, Learning Science Ltd.</td>
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<td>Senior Medical Writer, ApotheCom</td>
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<td>Science Communication</td>
<td>Head of Professional Development and Engagement, Physiological Society</td>
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<tr>
<td>Teaching &amp; Research</td>
<td>Blogger, Film Maker and News Reporter, CRUK</td>
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<td>Teaching Fellow, University of Bristol</td>
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<td>PhD student, University of Cambridge</td>
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Academic personal tutor

Throughout the degree course you will have a personal tutor who will help guide you through:

– transition to university
– becoming an independent learner
– unit choice
– personal development planning
– career planning
– provide a reference.
Come and join us!
Contact details

Dr Ann Pullen
Admissions Tutor
Cellular and Molecular Medicine
Faculty of Biomedical Sciences
University of Bristol

a.m.pullen@bristol.ac.uk

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