

**Department of Biology, York and  
Centre for Immunology and Infection (CII), HYMS/Biology**

**for 2017 intake, HYMS Intercalated BSc program**

**Study themes:**

- Cancer biology**
- Infectious disease and immunology**
- Molecular aspects of disease / Cell biology**
- Neuroscience**

**Course objectives:**

The overall aim of the intercalated degree programme at Biology York/CII is to give interested medical students the opportunity to gain expertise in and a greater understanding of the fundamental processes underpinning health and disease. We offer modules that teach cellular and molecular processes in study themes such as cancer biology, infectious disease, immunology, and neuroscience. The possibility to carry out a piece of original and independent research in the laboratory will give students an insight into the problem-solving and organizational skills involved in doing research.

Advances made in basic science provide the basis for the development of novel and improved methods of diagnosis and treatment of disease. The intercalated degree programme will offer a background to these exciting developments and will be beneficial not only for those wishing to apply for clinical training fellowships, but also for doctors of the future who want to understand the basis of medical conditions that they will treat and advise upon.

**Outline of degree programme:**

Students will study alongside final-year BSc Hons students in Biology and Biochemistry in the Department, and will undertake a research project associated with a specific study theme, six taught modules, and one Research Skills module.

The relative weighting of the different components is as follows:

Research project	40 credits
Six taught modules*	10 credits each
Research Skills module, assessed by two finals papers (Open Essay + Comprehension and Criticism paper)	20 credits
<b>Total</b>	<b>120 credits</b>

\*It is highly recommended that you choose at least five modules at level 6, as i) those modules prepare you better for the final exams, and ii) to minimize scheduling clashes that unavoidably will occur between level 5 and level 6 modules.

### **Intercalated teaching:**

A number of relevant level 5 (second-year/Stage 2) and level 6 (final-year/Stage 3) **modules** (each worth 10 credits) are available to intercalating students (see below). You need to take a total of six of these modules, a maximum of two that can be at level 5. Biology highly recommends that you choose at least five level 6 modules, because i) those modules will prepare you better for the final exams, and ii) to minimize scheduling clashes that unavoidably will occur between level 5 and level 6 modules. Level 5 modules comprise on average 14 lectures plus a variable number of practicals and workshops; contact hours = ~20-40 hrs. Level 6 modules comprise ~12 hours of formal contact resulting from 9 lectures. Each module will be assessed as a closed exam (comprising an essay plus short-answer questions) at the start of the term following the taught module.

### **Modules to choose from at the Department of Biology:**

<b>Term</b>	<b>Level</b>	<b>Module title</b>
<b>Autumn</b>	5	Immunology
	6	Cancer and the Cell Cycle
	6	Cell and Tissue Engineering
	6	Learning and Memory
	6	Bacterial Pathogenesis
	6	Principles of Molecular Virology
<b>Spring</b>	5	Neuroscience
	5	Pharmacology
	6	Advanced Topics in Developmental Biology
	6	Advanced Topics in Immunology
	6	Brain in Health and Disease
	6	Epigenetics in Development and Disease
	6	Human Molecular Parasitology
	6	Mechanisms to therapies

You can find out more about each of these modules by downloading their respective module synopsis from these websites:

For level 5 modules (i.e. Stage 2 modules; Immunology, Neuroscience):

<http://www.york.ac.uk/biology/intranet/currenttaughtstudents/intercalatedyear/modules/#tab-2>

For level 6 modules (i.e. Stage 3 modules; all the rest):

<http://www.york.ac.uk/biology/intranet/currenttaughtstudents/intercalatedyear/modules/#tab-3>

New Stage 2 Pharmacology module:

<http://www.york.ac.uk/biology/intranet/currenttaughtstudents/stage1biomedicalsciences2015cohort/stage1biomedicalsciencescohort2015/#tab-2>

New Stage 3 Mechanisms to therapies module:

<http://www.york.ac.uk/biology/intranet/currenttaughtstudents/stage2biomedicalsciences2014cohort/modules2014biomedicalsciencescohort/#tab-3>

In addition, intercalating students will take a **compulsory Research Skills module**. This module is worth 20 credits and will comprise of 10 lectures, 4 journal club sessions, and 14 research seminars. The Research Skills module will be assessed by **two examinations** also taken by final-year Biology undergraduates. **The first is an “Open Essay”** selected from a list of ~25 titles that are released in week 1 of autumn term. The essay must not exceed 3,000 words, and you have 8 weeks to research and write the essay before submission by week 8 of autumn term. **The second is a “Comprehension and Criticism paper”**. This paper is a 3-hour closed examination in the summer term that involves discussion and criticism of a research article. The objective of this exam is to assess your ability to read, understand and critique a scientific research article. Exam questions will test whether you have understood what was done and why and whether the

conclusions drawn are consistent with the evidence and arguments presented. There there will be three research articles, but students only have to answer questions on one. The articles will be released via an emailed link one week ahead of the exam to allow time for careful reading and critical thinking ahead of the closed exam. Students may choose to read one article or all three articles ahead of the exam.

### **Research projects:**

Projects for intercalating students are available within several subject areas (see below). The project is worth 40 credits and will take place over two terms (autumn+spring). Each of the supervisors who have offered projects have research groups of 2 to 15 staff comprising of post-doctoral research fellows, technicians, PhD and Masters students. Most labs also host Biology, Biochemistry, and Biomedical Sciences undergraduates during their final-year research project. Combined you will find plenty of expertise and help available during your research project. The research project will be assessed by a written report and an oral presentation.

### **Research project themes with supervisors and indicative project titles:**

#### **Cancer biology**

Dr Will Brackenbury	Expression of voltage-gated sodium channel subunits in breast cancer cells
Dr Dawn Coverley	Cancer and the cell cycle
Dr Dimitris Lagos	MicroRNAs in angiogenesis and cancer
Prof Norman Maitland	Expression of prostate cancer stem cell-specific genes
Prof Jenny Southgate	Drivers of muscle-invasive bladder cancer

#### **Infectious disease and immunology**

Dr Mark Coles	Computational modelling of antibody responses
Dr Allison Green	Dysregulated immune tolerance and autoimmune disease
Prof Paul Kaye	How pathogens are recognised by the immune system
Dr Marika Kullberg	Inflammatory bowel disease and immune responses to intestinal bacteria
Dr Dimitris Lagos	MicroRNAs in immune responses
Dr James Moir	Why do bacterial pathogens <i>Neisseria meningitidis</i> and <i>Neisseria gonorrhoeae</i> cause human disease?
Prof Jeremy Mottram	Animal models for Leishmania pathogenesis
Prof Antal Rot	Pathophysiological roles of atypical chemokine receptors
Dr Nathalie Signoret	Chemokine signalling in immune cells
Prof Jenny Southgate	Human models of urinary tract infection
Dr Gavin Thomas	Understanding bacterial mechanisms used to evade the innate immune response
Dr Marjan van der Woude (tbc)	Bacterial pathogenesis

#### **Molecular aspects of disease / Cell biology**

Dr Gonzalo Blanco	Optimizing skeletal muscle genome editing in adult mice
Dr Paul Genever	Adult stem cells, signalling pathways in skeletal tissues
Dr Betsy Pownall	Human genetic disease in a zebrafish model
Dr Paul Pryor	Lysosomes in innate immunity
Prof Jenny Southgate	Tissue engineering and regenerative medicine (TERM) in the urinary bladder
Dr Sean Sweeney/Dr Nia Bryant	Using flies to dissect the molecular mechanisms underpinning human congenital neutropenia
Dr Daniel Ungar	Cell culture models of human glycosylation disorders

#### **Neuroscience**

Dr Chris Elliott	Parkinson's disease modelled in <i>Drosophila</i>
Dr Gareth Evans	Molecular mechanisms of Alzheimer's pathology
Dr Darren Goffin	Investigating neural mechanisms underlying Rett syndrome
Dr Sean Sweeney	Identifying pathogenic mechanisms in frontotemporal dementia using <i>Drosophila</i>
Prof Miles Whittington	The origin of EEG brain rhythms: An <i>in vitro</i> model approach

## Research project supervisors, affiliation, and e-mail addresses

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Web pages:

<http://www.york.ac.uk/biology/>

<http://www.york.ac.uk/cii/>

Department of Biology

Centre for Immunology and Infection, CII

### **Information about the Department:**

The **Department of Biology** at York is active in both research and teaching with ~80 academic staff, and it offers degree programmes in Biology, Biochemistry, Molecular Cell Biology, Genetics, Biotechnology and Microbiology, and Ecology. Moreover, in Oct 2014 we welcomed our first cohort of students on a **new Biomedical Sciences degree programme** that focuses on topics relating to medicine and human health taught from the biosciences angle. This new programme is delivered by four departments with outstanding biomedical research activity: the Department of Biology, the Hull York Medical School, the Department of Health Sciences, and the Department of Psychology. The launch of Biomedical Sciences in York coincided with the opening of a brand-new 1700 m<sup>2</sup> teaching building that house two large high-tech teaching laboratories and a 120-seat computer room. Many of the final-year modules on offer on the Biomedical Sciences degree programme will be suitable and attractive for intercalating students from the 2016 student intake onwards.

Teaching in the Department is highly regarded by our students. The Department of Biology was ranked 5th in the UK for teaching excellence in the Guardian University Guide 2016, and 6th in the

2016 Complete University Guide. In the Guardian University Guide, Biology York scored high in terms of student satisfaction with the course (97%) and teaching (96%).

The most recent external review of our research – the 2014 Research Excellence Framework – placed Biology at York in the top 10 in the UK. Moreover, Biology at York was ranked 1st in the UK for research impact; our research has had major influence on environmental policy, industry and health. Several independent research units with biomedical interests are also based in the Department, including the **Centre for Immunology and Infection (CII)**, a joint research centre created by HYMS and the Department of Biology. Two other research units that are based in the Department are **YCR Cancer Research Unit** and the **Jack Birch Unit for Molecular Carcinogenesis**. Further information about the Department is available at <http://www.york.ac.uk/biology/>.