

Barts Cancer Institute  
MSc Molecular Pathology and Genomics



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# Introduction

The MSc in Molecular Pathology and Genomics is run by the Barts Cancer Institute, one of the top 5 cancer research institutions in the UK (Research Assessment Exercise 2008). The Institute is part of the Barts and The London School of Medicine and Dentistry, Queen Mary University of London, and is based at the Charterhouse Square campus in the heart of the City of London.

The MSc Molecular Pathology and Genomics programme is taught by experts in the field. The taught element takes place over semester one and two and semester three will be spent entirely on a laboratory based project based in an active research group in one of the Institutes six research centres.

This programme is available as a full-time, part-time, or distance learning programme.

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# Barts Cancer Institute – a Centre of Excellence

The MSc in Molecular Pathology and Genomics at the Barts Cancer Institute is taught by renowned experts in the field and the innovative learning environment offers you an exceptional educational experience, exposure to modern techniques and state of the art laboratories. We are committed to developing the next generation of scientists and clinicians.

The Barts Cancer Institute, part of the Barts and The London School of Medicine and Dentistry, Queen Mary University of London, was formed in 2003 and in a short space of time has become one of the leading cancer research institutions in the UK.

We were awarded Cancer Research UK Centre of Excellence status in 2009 and have continued to move towards our goal of establishing a comprehensive cancer centre translating cancer research to patient treatment.

The Institute's Teaching Centre, based in the Joseph Rotblat Building, is dedicated to the Institute's MSc students.

The centre's facilities include a fully equipped laboratory and computer room.

## The Institute has 6 research centres

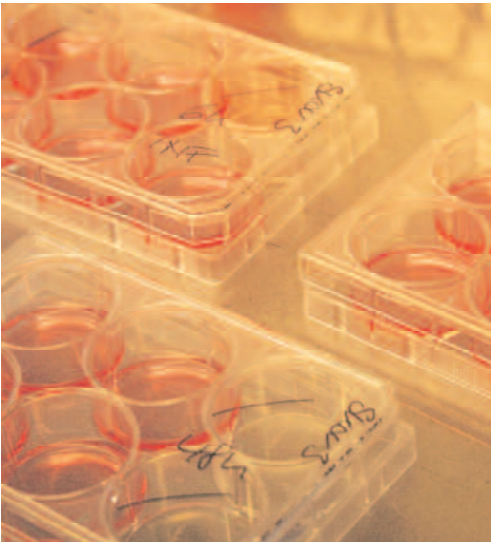
- **Centre for Cancer and Inflammation**  
Professor Fran Balkwill
- **Centre for Cell Signalling**  
Professor Bart Vanhaesebroeck
- **Centre for Experimental Cancer Medicine**  
Professor Nick Lemoine
- **Centre for Haemato-Oncology**  
Professor John Gribben
- **Centre for Molecular Oncology**  
Professor Iain McNeish
- **Centre for Tumour Biology**  
Professor Ian Hart



# MSc Molecular Pathology and Genomics

The MSc in Molecular Pathology and Genomics combines core teaching of disease mechanisms and molecular technologies with an emphasis on development of critical and practical skills that will prepare you to undertake higher level research in an academic, professional or industrial setting.

The Barts Cancer Institute brings together scientific and clinical groups of international reputation in the fields of molecular biology, genomics, molecular diagnostics and pathology. Together with state-of-the-art laboratories, and complimentary teaching from the Institute of Cell and Molecular Sciences, the Genome Centre and Clinical Departments of Barts and The London, this concentration of expertise and facilities provides an excellent setting for the delivery of this programme.



## Learning objectives

On completion of the programme students will be able to:

- Demonstrate a core understanding of human pathology and molecular biology
- Have an in-depth knowledge of the principles and applications of molecular technologies as applied to human disease, in particular cancers
- Be proficient in experimental design, bioinformatics, data mining and interpretation
- Demonstrate skills in oral and written presentation and in critical review of the literature
- Contribute to the research process through experience of a laboratory project placement
- Understand the ethical framework of the research process.

## Career prospects

This programme will provide the skills and experience necessary to pursue further academic research at PhD/MD(Res) level either within the Institute, or elsewhere. It provides a strong foundation for those working in a clinical, pharmaceutical or diagnostic setting and can be used as a springboard for students wishing to enter medical school.

# Programme structure

## Programme specification

### **Awarding body/institution:**

Queen Mary, University of London

### **Teaching institution:**

Barts and The London School of Medicine and Dentistry

### **Name of final award:**

Postgraduate Certificate (PGCert)

Postgraduate Diploma (PGDip)

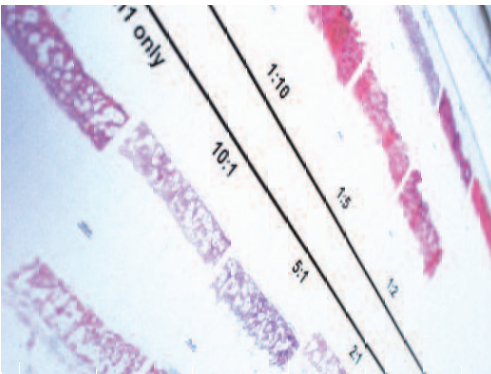
Master of Science (MSc)

### **Programme Director:**

Professor Louise Jones

The programme will run two years for part-time students and one year for full-time students.

Students must successfully complete all core modules and one option module, and undertake an original research project, which will be submitted as a dissertation (equivalent to four modules).



## Core modules

### **Research Methods and Science skills (2.0 unit module)**

#### **Dr John Marshall and Dr David Prowse**

The module contains both taught and practical elements in which students:

- Learn about the principles and applications of a range of laboratory techniques and data analysis
- Are made aware of the ethical framework in which research is undertaken
- Gain experience in handling tissue samples
- Learn about and use a range of statistical methods.

### **Basic Molecular Biology (1.0 unit module)**

#### **Professor Ian Hart**

- To provide an understanding of nucleic acid biochemistry
- To provide an understanding of molecular biology of the cell and how biochemical processes are integrated
- To become familiar with the terminology and concepts of molecular processes
- To develop an understanding of basic molecular techniques.

## **Basic Pathology (1.0 unit module)**

**Professor Louise Jones and Professor Ian Hart**

- To provide an understanding of basic disease processes
- To become familiar with the terminology and concepts of pathological processes
- To develop an approach to identify tissue types and interpret the histological features of pathological processes.

## **Genomic Approaches to Human Disease (0.5 unit module)**

**Professor Bryan Young  
and Dr Tanja Crnogorac-Jurcevic**

This module will provide detailed teaching on the principles and interpretation of large scale genomic and proteomic approaches to cancer, including:

- The application of genomic technology
- The working principles of expression array and genotype array technology
- The principles of bio-statistical analysis of genomic data
- The advantages and limitations of the various genomic approaches described
- The use of proteomic approaches in studying cancer.

## **Molecular Diagnostics and Therapeutics (1.0 unit module)**

**Dr Duncan Clark**

- To provide an understanding of the principles and practice of molecular diagnosis in the detection and management of disease
- To provide an understanding of quality assurance issues in the diagnostic setting
- To give examples of the use of current molecular techniques in the management of disease
- To provide practical experience of molecular techniques.

## **Cancer Prevention and Screening (0.5 unit module)**

**Professor Peter Sasieni  
and Professor Stephen Duffy**

This module will provide an understanding of population based studies and methodology used in cancer epidemiology, focusing on the value of these approaches in cancer prevention and in the design and evaluation of screening programmes. Topics covered include:

- The major environmental causes of cancer and their contribution to cancer worldwide
- The potential for reducing cancer incidence
- The role of screening in cancer control
- The prospects for the chemoprevention of cancer in the next ten years.

# Programme structure (cont)

## **Molecular Pathology of Solid Tumours (1.0 unit module)**

**Professor Louise Jones**

This programme aims to provide students with detailed knowledge of the molecular mechanisms involved in cancer development and to give an appreciation of the current 'hot topics' in cancer research and their relevance to cancer diagnosis and management. The major topics to be covered are:

- The molecular mechanisms involved in cancer development
- The role of the microenvironment in cancer
- Emerging changes in classification of cancers
- Predisposition to cancer
- Cancer stem cells.

## Module options

### **Molecular Genetics of Haematologic Malignancies (1.0 unit module)**

**Professor John Gribben**

This module will cover the fundamental molecular and biological mechanisms involved in the development of leukaemia and lymphoma. It will specifically address the impact of chromosome abnormalities on the diagnosis, prognosis, risk stratification and management of patients, and include a theoretical and practical understanding of cytogenetic and molecular cytogenetic technology. The contribution of the host microenvironment to tumour cell survival and proliferation will also be discussed.

### **Biological Therapies (1.0 unit module)**

**Professor Fran Balkwill and Professor Iain McNeish**

This module will provide an understanding of the science behind the biological therapies of cancer and an up-to-date review of the current status of preclinical and clinical trials. The module will also provide an insight into the ways that laboratory research is translated into clinical trials. By the end of the module students will be able to:

- Understand the basis of biological therapy of cancer
- Understand the role of non-malignant cells and mediators in cancer growth and progression
- Understand the mechanisms by which knowledge of cancer biology is translated into clinical trials.

### **Introduction to Bioinformatics (1.0 unit module)**

**Dr Claude Chelala**

The aim of this module is to offer an introduction to the application of computational methods to the analysis of biological data.

**Students must select one out of the three option modules. We require minimum of six students for an optional module to run for the academic year.**



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# Laboratory Project

## (4.0 unit module)

The aim of this module is to give students the opportunity to complete a substantial research project within a research laboratory. An appropriate project will be assigned to each student according to their interests. This module will give students the experience of working as part of a research group.

On completion of the project, the student will be able to:

- Carry out background research into a project
- Design and implement their own experiments
- Interpret data and analyse their own results
- Prepare a scientific project report
- Prepare and give an oral presentation describing project.

## Programme timetable

### Semester one modules (September – December)

- Research Skills and Sciences
- Basic Molecular Biology
- Basic Pathology

Semester one examinations: January

### Semester two modules (January – April)

- Genomic Approaches to Human Diseases
- Molecular Diagnostics and Therapeutics
- Cancer Prevention and Screening
- Molecular Pathology of Solid Tumours
- Introduction to Bioinformatics\*
- Molecular Genetics of Haematologic Malignancies\*
- Biological Therapies\*

Semester two examinations: April

*\*Modules Options: Availability of these options is subject to minimum student numbers.*

### Semester three – lab project (April – July)

12-week laboratory project

Semester Three presentations and viva – August

### Winter Graduation

December

**Full-time:** Students will have two full days of teaching in semesters one and two, and 12 weeks in the lab for semester three.

**Part-time:** Students will have one full day of teaching in semesters one and two for two academic years, and can select which year to do the lab project (providing academic requirements are met).

Please note the academic timetable is provisional and is subject to change.

**Distance learning option:** This programme is also available as a distance learning option, based on Blackboard. Students are able to follow each lecture online via lecture recording and slide/whiteboard content. All assigned work is submitted via Blackboard. Students are encouraged to interact with teaching staff and other students via online discussion forums and joint or group activities, and also attend a summer school.

# Teaching, learning and assessment strategies

## Teaching strategy

Module and project teaching will comprise the following:

- Seminars/lectures
- Practical classes in our dedicated teaching laboratory in pairs or small groups, where you will receive hands-on training for specific methods
- Demonstrations – these will take place in Institute laboratories or the classroom to teach specific technologies (expression array technology) or methods (array data analysis)
- Student poster and oral presentations on specific topics.

## Additional learning and support

- Individual tuition will take place for all students during the four-unit project module, or for students who require additional input in a particular topic area.
- Mentors are provided on entry to the programme. This mentor will advise on issues arising from the programme and on employment and further training opportunities.
- You will be encouraged to attend the Institute's weekly seminar programmes where you will have the opportunity to hear internal and external clinical and non-clinical researchers talk about their work. You will also be invited to the Distinguished Guest Lecture series which will have internationally renowned scientists present their research.
- Additional support classes for academic English language and IT packages are also available.



# Student experience

Luisa Josephine Eleonore Robbez-Masson,  
2008/09 Graduated with Distinction

I am an EU student from France where I started my undergraduate studies for three years. As I have always been passionate about London, I moved here for a BSc in biology. The modules were very general and I had to adjust to a new language and culture so I did not focus on my studies as much as I should. However, I love science and was not interested in stopping my studies. Because genetics was my favourite topic I applied to the MSc Molecular Pathology and Genomics course at Queen Mary, a much more prestigious university than my previous one. The lectures only took two days of the week but the frequent deadlines made my weeks very busy. I greatly enjoyed the first semester where I discovered so much about pathologies such as cancer; a topic that I knew very little about. The lecturers, who are all research group leaders in Queen Mary, shared their passion and experience with us. As the year progressed I could see my knowledge and comprehension increase quickly thanks to them. I was also becoming more and more comfortable with oral presentation, which was my weakness in my undergrad experience.

I then went on choosing my lab project. I was really curious about cell signalling and chose a project about the c-Met receptor. The project was intense but it definitively convinced me that I was made for the lab. The atmosphere in the department was great so I happily applied for a PhD there and was accepted. Eventually I graduated with distinction and was awarded the best oral presentation for my project (to my own surprise!).

I now have my focus on my PhD, which I could never have done without my MSc in Queen Mary.

Graduate profile: Nia Emami-Shahri, 2008/09,  
2008/09 Graduate with Merit, Student rep

The MSc at the Barts Cancer Institute offers you the chance to be taught by scientists at the cutting edge of research in their fields. Molecular biology and pathology of cancer is under vigorous investigation within the scientific community. You will get to take part by learning the theory behind the investigations as well as conduct your own experiments using core scientific techniques as well as conduct your own experiments using core scientific techniques within this field. The MSc is multi-disciplinary in nature that allows you to focus on your area of interest, but also to work within related subject areas. The MSc Molecular Pathology and Genomics has provided me with both the academic drive and practical fluency to have a successful career within science.

# Further information

## Fees

The fees for the programme are:

Home students (UK and EU)		
	Full-time (one year)	Part-time (two years)
Programme fees	£4900	£2450 per annum
Bench fees	£1900	£950 per annum

Overseas students (non-EU countries)		
	Full-time (one year)	Part-time (two years)
Programme fees	£15150	£7900 per annum
Bench fees	£1900	£950 per annum

*(Fees are an approximation based on the 2010/11 rates and are subject to adjustment for the 2011/12 academic year)*

## Admission criteria

For admission to the programme you will need either:

- A good degree or degree equivalent from a recognised academic institution;
- or
- An appropriate, equivalent, professional qualification, or experience, acceptable to the Programme Director and Institute Postgraduate Tutor.

Students for whom English is a second language will also require a minimum IELTS 7 or TOEFL 610 score.

Other factors contributing to selection for entry are:

- Previous educational qualifications
- Work and research experience
- The reasons for studying
- Future career and/or research plans
- Letters of recommendation.

## Enquiries

### Teaching Centre

Tel: +44(0) 207 882 2081

email: [cancercourses@qmcr.qmul.ac.uk](mailto:cancercourses@qmcr.qmul.ac.uk)

[www.bci.qmul.ac.uk](http://www.bci.qmul.ac.uk)

### Programme Director:

Professor Louise j Jones

Tel: +44(0)207 882 3577

email: [l.j.jones@qmul.ac.uk](mailto:l.j.jones@qmul.ac.uk)

## How to apply

Please visit our website for further details and online application information.

Alternatively please email us:

email: [cancercourses@qmcr.qmul.ac.uk](mailto:cancercourses@qmcr.qmul.ac.uk)

[www.bci.qmul.ac.uk](http://www.bci.qmul.ac.uk)

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# Barts and The London School of Medicine and Dentistry

## Our Campus

The Barts Cancer Institute based on the beautiful grounds of Charterhouse Square campus, in the heart of the City of London.

The historical and modern buildings set the backdrop for this diverse area of London, which is just a short tube journey from the new London Olympic Village.

The local area is buzzing with cafes, restaurants, and markets, with the Barbican Centre at your doorstep hosting year round events and exhibitions relating to theatre, dance and music ensuring there is something for everyone.

## Barts and The London Medical School

Barts and The London School of Medicine and Dentistry is a major centre of medical and dental teaching and research in London. It was formed in 1995 following the merger of the Medical College of St Bartholomew's Hospital and the London Hospital Medical College, both important training institutions with long and distinguished histories.

Barts and The London offers an international levels of excellence in research and teaching while serving a population of unrivalled diversity.

At the heart of the School's mission lies world class research, the result of a focused programme of recruitment of leading research groups from the UK and abroad and a £100 million investment in state-of-the-art facilities.

## Queen Mary, University of London

Queen Mary is an extremely attractive place to study, offering first-class academic teaching and resources in one of the world's most dynamic cities. Founded in 1887 as the People's Palace, Queen Mary became part of the University of London in 1915.

We are currently ranked in the top 120 universities in the world (THES World University Rankings 2010/11) and the work of our 2,800 academic staff regularly features in the news – both in the UK and internationally – [www.qmul.ac.uk/news/](http://www.qmul.ac.uk/news/)



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“Queen Mary has caught the mood of regeneration in east London.”

Sunday Times Good University Guide

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# Notes

Scan the QR code below to visit the MSc Molecular Pathology and Genomics mobile friendly webpage.

QR readers can be downloaded for free online. Data charges may apply. Please contact your network provider for more details.





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