**BSc Medical Sciences with Respiratory Science**

**Introduction**

Respiratory disease is common, reflecting environmental, occupational and inherited factors. Respiratory patients have a significant clinical and economic impact on the NHS and respiratory conditions have a substantial personal impact on the affected individuals and their families. This course gives students an opportunity to study in depth the science underlying a number of respiratory conditions and their management.

This course will comprise a two week introductory foundation course followed by three 5-week taught modules and either a research project or a specialist course (two 5-week modules).

**Course Director:** Dr Louise E Donnelly l.donnelly@imperial.ac.uk

**Aims and Objectives**

The aim of this course is to provide a scientific basis for the practice of, and research into, respiratory medicine. It will allow students to achieve the following broad outcomes:

* An understanding of the molecular, cellular and pathophysiological processes of a range of pulmonary diseases and of how this knowledge underpins diagnostic investigations and provides the evidence base for conventional and novel treatment strategies.
* An understanding of the principles of research and the ability to assess critically published evidence and data generated in the laboratory
* The ability to communicate scientific concepts effectively with professional colleagues both verbally and in writing
* The ability to work effectively in groups in order to perform practical studies and to be able to communicate scientific knowledge accurately to other students
* An understanding of the epidemiological principles that underpin the conduct of a clinical audit

In addition, the specific course objectives are to provide students with an understanding of the:

* Burden of lung disease, nationally and internationally
* Principles underlying the diagnosis and investigation of lung disease
* Techniques used to diagnose lung disease
* Molecular and cellular basis of pulmonary inflammation (e.g. in COPD, asthma, acute lung injury, cystic fibrosis and idiopathic fibrosis)
* Role of environmental factors in these processes (e.g. smoking, occupational allergens, infectious agents)
* Role of specific mediators in the healthy and diseased lung
* Principles of drug development for lung disease
* Use of established guidelines in clinical practice
* Laboratory investigation and research into lung disease
* Ethical use of animal models to investigate mechanisms of lung disease
* Role of epidemiological investigation in the study of cause of disease

**Content**

The course content will include a broad range of respiratory sciences including, the physiology and pharmacology, pathophysiology, genetics and epidemiology of lung diseases and pulmonary diagnostics. Importantly, students will have the opportunity to attend clinics and observe novel diagnostic procedures in a research-active environment, thus relating their newly acquired scientific knowledge in a variety of clinical contexts. Our BSc students will be encouraged to attend grand rounds and seminars, often from prestigious international visiting scientists. By the end of the BSc, students will have an understanding of the scientific basis of lung diseases, the aetiological factors involved, the investigation of these processes, and novel treatments not yet in routine practice.

**Format of teaching**

The course will be taught in a mixture of lectures, seminars, practical classes and clinic visits. Students will also be encouraged to attend the winter meeting of the British Thoracic Society to gain wider experience of academic medicine.

**Introductory Module:**

**Module Leader: Dr Sue Smith,** Royal Brompton campus sue.smith@imperial.ac.uk

**Overarching Aim**

To provide students with the tools to develop and extend the study and research skills necessary to complete a successful BSc.

**Specific Aims**

* To revise the anatomy, physiology and pharmacology of the human respiratory tract.
* To improve practical laboratory skills
* To enhance the ability to critically appraise written sources and verbal presentations
* To improve the ability to carry out a literature search and write a well structured and scholarly essay

**Content**

Although we will be reviewing and expanding knowledge and understanding of respiratory science, learning facts is not the primary focus of the introductory course. In contrast, it is an opportunity for students to improve their abilities to search and appraise the scientific literature, communicate scientific concepts verbally and in writing, and learn more about experimental design. The tutorial programme forms the backbone of the module during which students will be working with the same assigned tutor throughout to enable continuity and the giving of targeted feedback where necessary.

**Module 1: Investigation, management and new therapies for lung disease: Bench to Bedside**

**Module Leaders**

**Dr Louise Donnelly, Royal Brompton campus l.**donnelly@imperial.ac.uk

**Dr Duncan Rogers, Royal Brompton campus** duncan.rogers@imperial.ac.uk

**Aims**

**To understand the scientific basis underlying the pathophysiology of lung disease and the pharmacology of existing therapies and to use this knowledge to develop new therapies for the clinic.**

**Content**

* **Current therapies for specific lung disorders will be critically evaluated and used to introduce the concepts of evidence-based scientific and clinical strategies for the development of improved treatments**
* **The emphasis will be on investigating chronic respiratory conditions including chronic obstructive lung disease (COPD), cystic fibrosis, asthma, cough, sleep disorders and respiratory muscle dystrophies**

**Module 2: Molecular Cell Biology of the Lung in Health and Disease**

**Module Leaders**

Dr Uta Griesenbach, Royal Brompton campus u.griesenbach@imperial.ac.uk

Dr Meinir Jones, Royal Brompton campus meinir.jones@imperial.ac.uk

Professor Jane Mitchell, Royal Brompton campus j.a.mitchell@imperial.ac.uk

Professor Terry Tetley, Royal Brompton campus t.tetley@imperial.ac.uk

**Aims**

* To understand how the complex network of specialised cells maintain pulmonary homeostasis and contribute to lung disease via differential release, and response to, a discreet number of locally acting mediators.
* To understand the relative contribution of inherited traits and environmental factors to the pathology of specific lung diseases

**Content**

* The complex interactions of specific mediators including nitric oxide, endothelin-1 and cytokines and their relative contributions to lung health and diseases such as asthma, COPD, CF and pulmonary hypertension will be explored.
* Relevant/related cell signalling pathways and possible therapeutic interventions will be covered.
* The contributions of genetic diversity and environmental agents to lung disease etiology will also be covered.

**Module 3: Infectious and Allergic Lung Disease**

**Module Leaders**

Dr Michael Edwards, St Mary’s campus michael.edwards@imperial.ac.uk

Dr Debbie Jarvis, Royal Brompton campus d.jarvis@imperial.ac.uk

 **Aims**

* To understand the cellular and molecular mechanisms underlying

allergic hypersensitivity

* To understand cellular and molecular aspects of host defence to infectious microorganisms of the respiratory system
* To understand the contributions of infectious micro-organisms to human

respiratory disease in individuals and populations

* To explore interplay between respiratory infections and allergies in asthma.
* To describe current trends in allergic disease and apply basic

epidemiological principles to design and interpret epidemiological

studies

**Content**

* Overiew of innate and adaptive immunity of the respiratory tract.
* The immunological basis and clinical manifestations of allergic disease and its treatment.
* An overevew of the hygiene hypothesis, and how respiratory infections and allergic mechanisms can lead to asthma
* The consequences of respiratory tract infection with pathogenic micro-organisms and the immune and inflammatory responses to infection to the individual.
* Modulation of allergic mechanisms and immunity to infection as treatments for respiratory disorders.
* The effect of respiratory infections and population based interventions on reducing prevalence and severity of respiratory disease.

**Modules 4 and 5**

**Projects -** A wide variety of laboratory, library, and clinical projects willbe offered.