



## Postgraduate

## MSc in Drug Delivery

### Introduction

This programme aims to raise to an advanced level the awareness, skills and knowledge of scientists working in the Pharmaceutical and Medical fields in relation to the formulation and design of drug carrier systems and the specific requirements of a given drug in combination with its desired pharmacological action and its intended route of administration.

The main goal of this programme is to prepare students for an academic or industrial career in the Pharmaceuticals/Drug Delivery arena - an area in considerable demand in response to the continued increase in development of highly complex and sensitive drug molecules.

The programme provides specialist training and practical experience in the design and development of effective drug delivery systems, as well as promoting directly applicable skills for career and professional development.

This course is designed to provide a rigorous postgraduate scheme of education and training for life science or physical science-based graduate students seeking employment in the pharmaceutical industry or at the life sciences interface.

Students will gain an overview of Drug Delivery and have hands-on experience of Pharmaceutical Formulation and Drug Delivery. This will enable them to communicate across disciplinary boundaries whilst having depth in their own area. The course is also an excellent foundation for studies at the PhD level.

This course starts in October and is one year full-time.

### Programme outline

The course is based around a core of compulsory modules and a research project that provide detailed study and practical experience in Drug Delivery and in the development of professional skills. These modules will consider the biology of disease states, designing drugs and delivery systems, research methods and exploiting your research.

The supervised research project will last for approximately four months and be at the level similar to that expected for the first year of PhD studies. Examples include liposome-based drug delivery systems, strategies for enhancing drug solubility, and development of TB vaccines.

### Module Information

#### Drug Discovery

The aim of the module is to provide an overview of the drug discovery process from target to market. This module includes: an overview of the pharmaceutical industry; an introduction to receptors and drug action; biological evaluation of new compounds; drugs from nature; medicinal natural products - a biosynthetic approach; lead discovery and lead optimization; combinatorial chemistry and high throughput synthesis; drug chirality and its pharmacological consequences; prodrugs; absorption, distribution, metabolism, elimination and clearance; the role of toxicology in drug development; drug design and physicochemical properties; drug development; clinical trials; future trends - the "-omics" and case studies in drug design and drug discovery.

#### Chemotherapy & Selective Toxicity

This module aims to provide insight and understanding into the mechanisms of action of antibiotics used to control infectious diseases and of agents used in the treatment and control of cancer. The aim of the anti-infective material is to provide an understanding of the molecular targets and action of therapeutic agents, resistance and how this might be countered. For the cancer area the aim is to provide an enhanced understanding of the molecular biology of the cancer cell and the basis for conventional and novel therapies.

#### Drug Dosage Form & Design

This module provides students with an understanding and ability to apply the biopharmaceutical, pharmacokinetic and physicochemical principles important in the design and formulation of drug delivery systems and with an ability to collect, manipulate and interpret experimental data of relevance to drug

formulation and delivery. The topics that are covered include: Principles of drug absorption; Principles of drug distribution; Pharmacokinetic principles and pharmacodynamic outcomes; Bioavailability and bioequivalence and Modifying drug release.

### **Principles of Product Analysis and validation**

Analytical procedures to investigate and validate drugs are well recognised and reported however, development or regulatory procedures for drug delivery systems requires a more complex understanding of both the physical and chemical characteristics of the delivery system. This module will concentrate on the assessment of the physico-chemical parameters using a range of tools, and consider the implications of these properties at all stages of formulation, development, regulation and application of the medicine.

### **Drug Delivery and Targeting**

The latest advances in drug delivery and targeting will be addressed within this module. The aim is to develop the concept of drug targeting with drug carriers and provide an in depth appreciation of the strategies available and utilised for a particular drug and biological barrier. Site-specific delivery and targeting to specific tissues including tumours, liver, spleen, CNS, GIT and immune systems with reference to the biological barriers they present will be discussed. The advantages and current limitations of carrier systems such as microspheres and surfactant vesicles will be explored. The therapeutic opportunities afforded by biotechnology products, the barriers to their efficient delivery and targeting and strategies to circumvent these issues will be discussed.

### **Research Methods 1: Professional Development**

The professional skills taught in this module will equip you with general and transferable talents with broad application both within and outside of academia. You will also become aware of professional issues regarding research funding and exploitation and the importance of ethical codes for guiding best practice in research.

### **Research Methods 2: Communication Skills**

This module includes the following: critical analysis of published work, reviewing papers; writing abstracts, writing research papers, preparing poster presentations and oral presentation skills.

### **Research Project**

The research project involves experiential learning with the completion of a comprehensive literature review appropriate to the project. This involves the preparation of a detailed project plan including resourcing and costing of materials and appreciation of experimental design, power calculations where appropriate for study design, ethical and logistic considerations. In addition, an individual research project that includes practical work that involves data production, processing and analysis. The preparation of a detailed final project report (mini-thesis) and the preparation of a poster to illustrate the main findings from the project to an audience of fellow students and staff.

### **Assessment**

The course is assessed by a mixture of coursework, examinations, practical work, oral and written presentations. The research project module will be assessed on the basis of a submitted project report and an oral defense of a poster.

### **Entry requirements**

This course is open to suitably qualified international and UK graduates.

Potential students must hold a minimum of a lower 2nd class honours degree in pharmacy, pharmaceutical science, pharmacology, physiology, physical science, biochemistry, biotechnology, chemistry, chemical engineering, genetics, materials science, medicine or a related field from a recognised university; or an overseas degree recognised by Aston University, plus two references.

Students whose first language is not English must demonstrate a satisfactory command of written and spoken English before enrolment on the programme (demonstrated by an IELTS score of 6.5 or higher overall, but with no score below a 6.0).

### **Fee**

UK/EU students please refer to our web site for the current fee for this course

Scholarships and bursaries may be available for this course. Please refer to the website.

Details on application.

### **For further information please contact**

Life & Health Sciences School Office  
Tel: +44(0)121 204 4161/3965  
Fax: +44(0)121 204 4175  
Email: lhspgt@aston.ac.uk  
Website: <http://www.aston.ac.uk/lhs>

