

<b>Title</b>	Overall 4 <sup>th</sup> year pharmacology course
<b>Code</b>	PM4XX
<b>Credits</b>	60
<b>Courses and year of study for which module is designed</b>	4 <sup>th</sup> year undenominated science students (4BS2) 4 <sup>th</sup> year biomedical science students (4BO2 ) Intercalated medical students (4BS6)
<b>Course Coordinator</b>	Dr. Eilís Dowd

## Course Descriptor

### General aims of the 4<sup>th</sup> year pharmacology course:

*The aim of the 4<sup>th</sup> year pharmacology course is 1) to provide the students with a sound theoretical knowledge of advanced aspects of pharmacology, 2) to encourage the students to approach scientific reading and writing in a critical and unbiased manner, 3) to develop their written, verbal and visual scientific presentation skills, and 4) to expose the students to a “real” research environment through a 12-week independent research project.*

### Learning outcomes:

*On successful completion of the 4<sup>th</sup> year pharmacology course, the student should be able to:*

- 1) Demonstrate a detailed knowledge of fundamental pharmacological principles, and basic molecular and biochemical processes which are the foundation for pharmacological application.*
- 2) Demonstrate a detailed knowledge of the pharmacology of drugs that are currently used to treat a range of human diseases.*
- 3) Demonstrate an in-depth knowledge of recent developments in specific areas of pharmacology research.*
- 4) Critically appraise the historical and state-of-the-art pharmacology literature in order to make an evidence-based judgement on the contribution that established pharmacological approaches or recent advances have made (or may make in the future) to human health.*
- 5) Design, execute, analyse and present their original laboratory-based scientific research.*
- 6) Communicate their pharmacological knowledge (or findings) using a variety of verbal, written and visual means.*

### Overview of contributing modules:

Code	Name	ECTS	Semester	Assessment
PM431	Research Project	20	I	100% continuous assessment
PM432	Experimental Pharmacology	10	I	33.3% written paper, 2 hr 33.3% written paper, 2 hr 33.3% continuous assessment
PM433	Drug Development & Emerging Therapies	10	II	100% continuous assessment
PM434	Molecular Pharmacology & Therapeutics	10	II	50% written paper, 2 hr 50% continuous assessment
PM435	Advanced Technologies for Therapeutics	5	II	100% written paper, 2 hr
PM436	Advanced Toxicology	5	II	100% written paper, 2 hr

## 4<sup>th</sup> Year Pharmacology – Alignment of Module Delivery, Assessment and Learning Outcomes

Code	Name	ECTS	Delivery Method	Assessment Method	Learning Outcomes
PM431	Research Project	20	<ul style="list-style-type: none"> <li>- 12 week independent “wet-lab” research project</li> </ul>	<ul style="list-style-type: none"> <li>- Thesis</li> <li>- Supervisor’s Report</li> <li>- Seminars</li> </ul>	<ul style="list-style-type: none"> <li>- Design a scientific experiment to address a specific research question.</li> <li>- Demonstrate an awareness of the ethical considerations and safety implications of their scientific experiment.</li> <li>- Demonstrate technical skill and competency in relevant scientific procedures.</li> <li>- Work independently, responsibly and safely in the laboratory.</li> <li>- Generate, analyse, depict and critically interpret scientific data.</li> <li>- Synthesise and critically review relevant historical and state-of-the-art scientific literature.</li> <li>- Communicate scientific findings through appropriate verbal, written and visual means.</li> </ul>
PM432	Experimental Pharmacology	10	<ul style="list-style-type: none"> <li>- Journal Club</li> <li>- Workshops</li> </ul>	<ul style="list-style-type: none"> <li>- Abstract writing</li> <li>- Participation</li> <li>- Data interp.</li> </ul>	<ul style="list-style-type: none"> <li>- Critically interpret published scientific data generated using various molecular, in vitro and in vivo techniques and presented in different quantitative and qualitative formats.</li> <li>- Rapidly identify the key elements of a research manuscript (i.e. the background/rationale, aim, experimental design/methods, key findings and impact) and compile these into a short abstract.</li> <li>- Communicate the key elements of a research manuscript to the class using appropriate visual means (PowerPoint seminar).</li> <li>- Participate in critical discussions of research manuscripts.</li> </ul>
PM433	Drug Development & Emerging Therapies	10	<ul style="list-style-type: none"> <li>- Equipping lectures</li> <li>- Self-directed</li> </ul>	<ul style="list-style-type: none"> <li>- Drug Portfolio</li> <li>- Poster</li> <li>- Oral</li> </ul>	<ul style="list-style-type: none"> <li>- Use literature databases (e.g. PubMed) to find published manuscripts relevant to the main stages in the development of a CNS drug, and identify and extract the key information from the relevant manuscripts.</li> <li>- Compile and present the extracted data in clearly accessible formats (tabulated and essay).</li> <li>- Synthesise and critically assess the published literature in order to make an evidence-based judgement on the development of a CNS drug.</li> <li>- Demonstrate an awareness of the complexity of, and challenges inherent within, the CNS drug development process.</li> <li>- Make an evidence-based, critical judgement on the potential of an emerging therapy/novel target to address the unmet clinical needs of, and limitations of existing therapies for, human CNS conditions.</li> <li>- Design and prepare an informative and visually accessible poster using PowerPoint® software which highlights the evidence for progression (or otherwise) of an emerging therapy/novel target to the clinical marketplace.</li> <li>- Engage in a scientific discussion regarding the potential of an emerging therapy/novel target for the treatment of human CNS disease.</li> </ul>
PM434	Molecular Pharmacology & Therapeutics	10	<ul style="list-style-type: none"> <li>- Lectures</li> <li>- Equipping lectures</li> <li>- Self-directed</li> </ul>	<ul style="list-style-type: none"> <li>- Essay-based written exam</li> <li>- Student lecture</li> <li>- Lay article</li> </ul>	<ul style="list-style-type: none"> <li>- Demonstrate an in-depth knowledge of recent developments in molecular pharmacology research specifically in the areas of G-protein-coupled receptors, transcription factors and molecular drug development</li> <li>- Critically discuss the contribution that recent advances in molecular pharmacology have made (or may make in the future) to human health specifically in the areas of G-protein-coupled receptors, transcription factors and molecular drug development.</li> <li>- Demonstrate an in-depth knowledge of recent developments in molecular therapeutics research specifically in the treatment of cancer, immune diseases and pain.</li> <li>- Critically discuss the contribution that recent advances in molecular pharmacology have made (or may make in the future) to human health specifically in the treatment of cancer, immune diseases and pain.</li> </ul>
PM435	Advanced Technologies for Therapeutics	5	<ul style="list-style-type: none"> <li>- Lectures</li> </ul>	<ul style="list-style-type: none"> <li>- Essay-based written exam</li> </ul>	<ul style="list-style-type: none"> <li>- Demonstrate an in-depth knowledge of recent developments in technologies for therapeutics, specifically in the areas of biopharmaceuticals, drug delivery, cell therapy and gene therapy.</li> <li>- Critically discuss the contribution that modern approaches to technologies for therapeutics have made (or may make in the future) to human health, specifically in the areas of biopharmaceuticals, drug delivery, cell therapy and gene therapy.</li> </ul>
PM436	Advanced Toxicology	5	<ul style="list-style-type: none"> <li>- Lectures</li> </ul>	<ul style="list-style-type: none"> <li>- Essay-based written exam</li> </ul>	<ul style="list-style-type: none"> <li>- Use the language, terms, and definitions of toxicology.</li> <li>- Describe and evaluate specific factors important for environmental toxicology.</li> <li>- Describe and compare advanced mechanisms of toxic action, specifically chemically-induced mutagenesis, carcinogenesis and teratogenesis.</li> <li>- Describe and compare mechanisms of target organ toxicity.</li> <li>- Apply toxicological of principles outlined in outcomes 2-4 to specific classes of toxicant and specific situations.</li> <li>- Interpret experimental data describing chemical toxicity.</li> </ul>