



UNIVERSITY OF
PATRAS
ΠΑΝΕΠΙΣΤΗΜΙΟ ΠΑΤΡΩΝ

DEPARTMENT OF PHARMACY

SCHOOL OF HEALTH SCIENCES

UNIVERSITY OF PATRAS
SCHOOL OF HEALTH SCIENCES
DEPARTMENT OF PHARMACY
UNDERGRADUATE STUDIES' COURSES



COURSE DESCRIPTION: **MOLECULAR PHARMACOLOGY**
COURSE CODE: **PHA-D23-NEW**

**MOLECULAR PHARMACOLOGY
COURSE DESCRIPTION**

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	PHA-D23-NEW	SEMESTER OF STUDIES	8th
COURSE TITLE	MOLECULAR PHARMACOLOGY		
INDEPENDENT TEACHING ACTIVITIES	TEACHING HOURS PER WEEK	ECTS CREDITS	
Lectures	4	7	
Laboratory exercises	4		
COURSE TYPE	Scientific Field course		
PREREQUISITE COURSES:	-		
TEACHING AND ASSESSMENT LANGUAGE:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes [Instructed/Guided self study in english for Erasmus+ Students]		
COURSE WEBPAGE (URL)	http://www.pharmacy.upatras.gr/images/DS/PHA-D23-EN.pdf		

2. LEARNING OUTCOMES

Learning Outcomes
<p>The Learning Outcomes of this course corresponding to Level 7, comprise the following:</p> <ul style="list-style-type: none"> • Highly specialized knowledge, some of it cutting-edge in the field of Molecular Pharmacology, as a base for innovative thinking and research • Critical understanding of the knowledge status in this particular field and its interrelationship with other fields • Specialized skills for problem-solving, necessary in research and/or in innovation, in order to generate novel knowledge and processes • Management and evolution in changing, unpredictable and complex work environments, requiring novel strategic approaches • Responsibility for contributing to the enrichment of professional knowledge and practice in the field <p>In particular, upon completion, it aims to provide students with the following:</p> <ol style="list-style-type: none"> 1. Acquire a demonstrable knowledge and understanding of the knowledge area of Pharmacology and of Drug Action in humans, supported by supported by the use of textbooks of advanced level and by additional data derived from recent developments at the forefront of this field. 2. Understand the chemical cellular and physiological functional basis of therapeutic activity as well as of side effects

3. Be able to use the understanding and knowledge acquired in a manner showing a professional approach, based on analytical and synthetic inductive use of the data provided, in combination with other areas of knowledge to which they are exposed during their studies (e.g. Physiology, Biochemistry)
4. Be able to synthesize and communicate information and advice on problems related to the use and activity of drugs
5. Be able to approach complex novel problems related to pathophysiological situations and propose the right therapeutic (pharmacological) treatment and use of drugs
6. Students are expected to develop the skills and knowledge needed to continue in more advanced studies with a high degree of autonomy

General Abilities

Search, analyze and synthesize data and information, using the appropriate technology tools
 Adapt to new situations
 Decision- making
 Independent work
 Group work
 Work in an international environment
 Work in an inter-disciplinary environment
 Develop critical thought towards others and themselves
 Development of free, creative and inductive thinking

3. COURSE CONTENT

Lectures

Introduction to Molecular Pharmacology - Classic Approaches to Drug-Receptor Interaction

Drug response measurement systems – Binding assays

Agonists and stimulation-response mechanisms

Antagonists - Reduction of drug response

Ion channel Receptors - Ion channel-acting drugs

Receptors linked to G proteins

Phospholipases and phosphokinases - Protein Kinase C – Calcium ions - Adenylate cyclase and cAMP - Gaseous Mediators - Phosphodiesterases and therapeutic applications

Vitamins – Antioxidants

Drugs that affect the action of transcription factors (hormones, anti-inflammatory-immunosuppressants, drugs that affect metabolism, acne medications).

Therapeutic Approaches to Oncology

- Cytotoxic anticancer drugs
- New anti-cancer drugs: 1. Monoclonal antibodies, 2. Tyrosine kinase inhibitors, 3. Anticancer vaccines, 4. Apoptosis inducers, 5. Telomerase inhibitors, 6. Cdks inhibitors, 7. Inhibitors of angiogenesis, 8. Immunotherapy

Introduction to cytokines - Drugs acting on cytokine receptors - Drugs that act by affecting cytokines - Newer anti-inflammatory and immunosuppressive drugs that selectively target cytokines

Nucleic acids as drugs: antisense oligonucleotides, aptamers, gene therapy

Basic principles of cell therapy.

Laboratory Training:

- Tissue isolation and use in pharmacological experiments. Dose-response curve. Evaluation of experimental data.

- Isolation of membranes from cells in order to study drug binding to the corresponding receptor.
- Homogenization of tissue and isolation of membrane preparations in order to study drug binding to the corresponding receptor.
- Determination of total proteins in extracts of cells and tissues.
- Ligand binding experiments. Specific and non-specific binding. Determination of the affinity and rate of binding of the ligand to the receptor.
- Scatchard analysis. Determination of the dissociation equilibrium constant and the number of receptors.

Five computer exercises as follows:

- Pharmacology of receptors that are ion channels.
- Pharmacology of receptors associated with G proteins.
- Pharmacology of receptors with intrinsic tyrosine kinase activity.
- Nuclear receptor pharmacology.
- Enzymes as drug targets.

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	Face-to-face														
Use of information and communication technologies	Use of E-class platform to communicate with students and manage their tasks Use of PCs in teaching (lectures and lab courses)														
Teaching organization	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><i>Teaching Method</i></th> <th style="text-align: right;"><i>Semester Workload</i></th> </tr> </thead> <tbody> <tr> <td>Lectures</td> <td style="text-align: right;">52</td> </tr> <tr> <td>Laboratory work</td> <td style="text-align: right;">32</td> </tr> <tr> <td>Writing an essay</td> <td style="text-align: right;">16</td> </tr> <tr> <td>Personal (to each student) time for studying</td> <td style="text-align: right;">75</td> </tr> <tr> <td colspan="2"> </td> </tr> <tr> <td><i>Total number of hours for the Course (25 hours of work-load per ECTS credit)</i></td> <td style="text-align: right;">175</td> </tr> </tbody> </table>	<i>Teaching Method</i>	<i>Semester Workload</i>	Lectures	52	Laboratory work	32	Writing an essay	16	Personal (to each student) time for studying	75	 		<i>Total number of hours for the Course (25 hours of work-load per ECTS credit)</i>	175
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STUDENT ASSESSMENT	Evaluation done in greek In laboratory work: Pass/fail on report, to be able to take part in final written exam Written exam: Multiple choice questions, pairing Qs, and Qs requiring brief reasoning and justification, 100% of the final grade														

5. RECOMMENDED LITERATURE

Suggested Books (*greek translation*):

1. (Pharmacology) Φαρμακολογία, K. Whalen, R. A. HARVEY, 2015, Εκδ. Παρισιάνου
2. (Pharmacology), RANG, DALE, RITTER, MOORE, 2014, Εκδ. Παρισιάνου
3. (Basic and clinical Pharmacology) Βασική και Κλινική Φαρμακολογία, Katzung B., 2009, Εκδ. ΠΧ Πασχαλίδης
4. Goodman & Gillman's Η Φαρμακολογική Βάση της Θεραπευτικής (the pharmacological basis of therapeutics), 2015, Εκδ. ΠΧ Πασχαλίδης

Suggested Scientific Journals

Annual Review of Pharmacology and Toxicology
Nature Reviews Drug Discovery
British Journal of Pharmacology
Journal of Pharmacology and Experimental Therapeutics

Suggested sites

<http://www.guidetopharmacology.org/>
<https://www.fda.gov/Drugs/InformationOnDrugs/ucm075234.htm>
<https://www.galinos.gr/>
<http://www.eof.gr/web/guest/publications>