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

COURSE DESCRIPTION: **MOLECULAR GENETICS AND PHARMACOGENOMICS**
COURSE CODE: **PHA-B22-NEW**

MOLECULAR GENETICS AND PHARMACOGENOMICS
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-B22-NEW**	**SEMESTER OF STUDIES**	**4th**
COURSE TITLE	MOLECULAR GENETICS AND PHARMACOGENOMICS		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	3	7
Laboratory training	3	

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-B22-EN.pdf

2. LEARNING OUTCOMES

Learning outcomes
The course is the main introductory lesson in the concepts of Molecular Genetics and Pharmacologenomics. The subject matter of the course is to introduce students to the basic concepts of Molecular Genetics and Pharmacogenomics, the correlation of genetic changes with the occurrence of hereditary diseases, the genome structure at the level of genes and chromosomes. It also refers to introductory concepts and basic mechanisms of regulation of gene expression, such as transcription, epigenetic modifications, DNA replication and various molecular biology methodologies, so that the student has an overall understanding of the processes and methodologies used in this direction. Finally, the aim of the course is to help students understanding the concept of pharmacogenomics, its level of incorporation in clinical practice and its role in the individualization of treatment, with examples from its clinical application. Upon successful completion of the course the student will be able to: • Understand the basic concepts of Molecular Genetics and Pharmacogenomics • Appreciate the correlation of genetic changes with the occurrence of hereditary diseases, genome structure, genes and chromosomes • Distinguish between key mechanisms of regulation of gene expression, such as transcription, epigenetic modifications, DNA replication

- Comprehend the procedures and methodologies used in Human Molecular Genetics
- Understand the concept of pharmacogenomics, its rate of incorporation in clinical practice and its role in the individualization of treatment, with examples from its clinical application
- Perform at a very basic level experimental Molecular Biology and Genetics techniques in laboratory exercises
- Manipulate genetic data bases and in the extraction and analysis of these in the laboratory exercises
- Collaborate with his / her students to prepare a presentation (on an optional level) relevant to the subject and the objectives of the course.

General Abilities

- Autonomous Work
- Teamwork
- Presentations
- Critical thinking
- Search, analysis and synthesis of data and information, using the necessary technologies and laboratory-experimental tools
- Generation of new research ideas
- Promotion of free, creative and inductive thinking

3. COURSE CONTENT

Lectures

- Introduction to Molecular Genetics
- Gene families in humans and recurrent genes
- The eukaryotic genome
- Content of the genome
- Regulation of gene expression (transcriptional regulation, promoters, enhancers, silencers, LCRs, insulators, transcription activation)
- Chromosomes and nucleosomes, control of the chromatic structure, and processing of RNA
- Introduction to Human Molecular Genetics. Genealogical trees. Genetic diversity, mutations, gene transfer, sex-linked heredity, gene interaction
- Examples of monogenic diseases (Mediterranean anemia)
- Introduction to Pharmacogenomics
- Pharmacogenomic and clinical practice
- Pharmacogenomics in various medical specialties

Laboratory Training

The course "Molecular Genetics and Pharmacogenomics" is accompanied by a computational exercise and five experimental exercises, according to the laboratory guide of the course.

- Computational Exercise: Genetic databases
- Laboratory Exercise 1: Isolation of DNA
- Laboratory Exercise 2: Quality Control and Measurement of Nucleic Acid Concentration
- Laboratory Exercise 3: Polymerase Chain Reaction
- Laboratory Exercise 4: Restriction Endonucleases
- Laboratory Exercise 5: Reading of the primary DNA sequence and characterization of mutations

4. TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	Lectures (amphiteater) Face to face

USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Support Learning Process via the e-class platform 1. E-class 2. Educational Videos 3. NCBI / PubMed https://www.ncbi.nlm.nih.gov/pubmed
TEACHING ORGANIZATION	***Teaching Method*** — ***Semester Workload*** Lectures — 39 Practical exercises focusing on the application of methodologies and analysis of case studies to smaller groups of students — 39 Team presentation — 20 Independent study — 77 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit)** — **175**
STUDENT ASSESSMENT	I. Written final examination for theoretical knowledge (70%) including: • Multiple choice questions • Comprehension questions II. Written final examination for laboratory training (30%) including: After each training module the student are evaluated individually by submitting a written report. Also, at the end of the semester, the students are evaluated with multiple choice questions. III. Optional Group presentation (10%)

5. RECOMMENDED LITERATURE

Suggested Books:

1. Βασικές Αρχές Γενετικής, (Klug, Cummings, Spencer, Palladino), ISBN: 978-618-5135-03-4, Edition: 1/2015.
2. Genes VIII (Lewin), ISBN: 978-960-99895-9-6, Edition: 1/2013
3. iGenetics – Μια μεντελική προσέγγιση (Russell), ISBN: 978-960-99895-7-2, Edition: 1/2013
4. Εργαστηριακές Ασκήσεις Γενετικής του Ανθρώπου στον Ηλεκτρονικό Υπολογιστή και στον Πάγκο