UNIVERSITY OF PATRAS
SCHOOL OF HEALTH SCIENCES
DEPARTMENT OF PHARMACY

UNDERGRADUATE STUDIES' COURSES
IMPLEMENTED FROM ACADEMIC YEAR 2016-2017

COURSES DESCRIPTION

The file includes the Courses' Outlines of the Undergraduate Studies Program of the Department of Pharmacy for the Academic Year 2024-2025 and can be downloaded from the Department's website via this link.

INDEX PER COURSE AND SEMESTER OF STUDIES

3rd Year, Semester ⑥

4th Year, Semester ⑦

4th Year, Semester ⑧

5th Year, Semester ⑨

5th Year, Semester ⑩

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

COURSE DESCRIPTION: **GENERAL AND INORGANIC CHEMISTRY**
COURSE CODE: **PHA-A11-NEW**

GENERAL AND INORGANIC CHEMISTRY
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-A11-NEW**	**SEMESTER OF STUDIES**	**1st**
COURSE TITLE	GENERAL AND INORGANIC CHEMISTRY		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	4	6
Tutorial classes	2	

COURSE TYPE	General Background 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-A11-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes
This course aims at acquiring knowledge, skills and competences related to Level 6 of the European Qualifications Framework for Lifelong Learning. Specifically, upon successful completion of the course, the students are expected to: 1. have obtained valid knowledge and comprehension of the fundamental principles of General and Inorganic Chemistry, supported by scientific textbooks and recent data acquired from research in this scientific field. 2. have acquired the ability to combine theory and calculations in the field of General and Inorganic Chemistry to solve problems appearing during their studies and afterwards, while working as Pharmacists. 3. be capable to use the acquired knowledge in the field in a professional way.
GENERAL ABILITIES
Retrieve, analyse and synthesise data and information, with the use of necessary technologies Work autonomously Work in an interdisciplinary environment Work in an international context Be critical and self-critical Advance free, creative and causative thinking

3. COURSE CONTENT

- The structure of atom. Electromagnetic radiation- Atomic spectra. The dual nature of the electron.
- The uncertainty principle. The Schrodinger Equation- Quantum numbers, Atomic Orbitals. The Pauli exclusion principle.
- Periodic Table of the Elements. Atomic numbers and the periodic law. General Features of the Periodic Table, Electron configurations and Periodic properties of the elements. Magnetic properties.
- Chemical bonding. Ionic bonds, Covalent bonds, Coordinate covalent bonds, Dipole moment, Resonance, Valence bond theory – Hybridization. Valence Shell Electron Pair Repulsion (VSEPR) theory and molecular structure. Theory of Molecular Orbitals. Orbital overlap and bond strength.
- Gases. The ideal gas law, Kinetic theory of gases, Distribution of molecular speeds, Dalton's Law of partial pressures, Graham's law of diffusion.
- Liquids and Solids. Surface tension of liquids, vaporization - vapor pressure, boiling and boiling point, melting and melting point, vapor pressure of solid compounds, sublimation, phase diagrams, thermodynamic properties associated with phase transitions. Types of solids. Intermolecular forces.
- Solutions. Ways of expressing concentration, Dissolution – Enthalpy of Solution, Vapor pressure of a solution, Osmotic pressure
- Rates of reaction. Half-life of a reaction. Reaction rates and equilibrium.
- Chemical Equilibrium. Reversible reactions and equilibrium constants, Equilibrium constants in heterogeneous equilibria. Changing the reaction conditions – Le Chatelier Principle. Acid base equilibria in aqueous solutions, weak electrolytes, Ostwald's dilution law, Self-Ionization of water – pH, acid-base indicators, buffers, hydrolysis, the solubility product constant – precipitation, Common-Ion effect, neutralization reactions –titration curves.
- Acids and Bases. Bronsted-Lowry concept of acids and bases. Strong and weak acids and bases, Acid strength and molecural structure. Lewis theory.
- Chemical Thermodynamics. First Law of Thermodynamics. Enthalpy. Thermochemistry. Heat capacity. Temperature dependence of enthalpy change, ΔH. Entropy and the second Law of Thermodynamics. Temperature dependence of Entropy. Absolute entropies and the third Law of Thermodynamics. Free Energy and equilibrium constant. Temperature dependence of chemical equilibrium.
- Oxidation-Reduction reactions. Oxidation states. Balancing Oxidation-Reduction reactions in acidic and basic solutions.

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	Face to Face

Use of information and communication technologies	∞ The teaching and learning process is supported by the University of Patras e-class platform. The teaching material for each chapter is uploaded and stored on the e-class and it is freely accessible to all students. ∞ Teaching process is supported by Information and Communication
TEACHING ORGANIZATION	***Teaching Method*** — ***Semester Workload*** Lectures — 52 Tutorial classes — 26 Study and analysis of scientific papers and book chapters — 12 Private un-supervised study — 60 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit)** — **150**
STUDENT ASSESSMENT	Assessment language: Greek Final Written Exams: Multiple choice questions, short answer and matching questions, questions of judgement and solving of problems. The assessment criteria are presented to the students during the lectures and the tutorial classes.

5. RECOMMENDED LITERATURE

Suggested Books

1. General Chemistry, Principles and Applications, Darrell Ebbing & Steven Gammon
Translated by: Nikolaos Klouras
10th International Edition/2014, Travlos Publications
ISBN: 978-618-5061-02-9

2. Basic Inorganic Chemistry, A. Cotton, G. Wilkinson, P. Gaus
3rd Edition/2015, Parissianos Publications
ISBN: 9789605830663

Relevant Scientific Journals

Inorganic Chemistry (ACS Publications)

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DEPARTMENT OF PHARMACY
UNDERGRADUATE STUDIES' COURSES

COURSE DESCRIPTION: **INTRODUCTION TO PHARMACEUTICAL SCIENCES**
COURSE CODE: **PHA-A12-NEW**

INTRODUCTION TO PHARMACEUTICAL SCIENCES
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-A12-NEW**	**SEMESTER OF STUDIES**	**1st**
COURSE TITLE	INTRODUCTION TO PHARMACEUTICAL SCIENCES		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	2	6
Laboratory	4	

COURSE TYPE	General Background Course
PREREQUISITE COURSES:	-
TEACHING AND ASSESSMENT LANGUAGE:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Not offered
COURSE WEBPAGE (URL)	http://www.pharmacy.upatras.gr/images/DS/PHA-A12-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes
Generally, this class aims at acquiring knowledge, skills and competences related to Level 6 of the European Qualifications Framework for Lifelong Learning. The aim of the course is that the students: 1. Understand the subject of study in the pharmaceutical sciences 2. Know the history and evolution of pharmaceutical sciences 3. Being able to seek and evaluate scientific information in the international literature and to produce useful scientific conclusions 4. Know to use databases with information on the composition, formulation, storage and use of medicines 5. Have developed skills and knowledge relating to basic laboratory handling
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 though towards others and themselves
- Development of free, creative and inductive thinking

3. COURSE CONTENT

Lectures

History of Pharmacy - Milestones of Pharmaceutical Sciences

Organization of studies at the Department of Pharmacy of the University of Patras

Professional aspects of Pharmacy - Specialties

New drug development - Pharmacopoeias

Prospects for evolution in Pharmaceutical Sciences

Laboratory Training

- ∞ Scientific Methods in Pharmacy - The search and use of scientific literature
- ∞ Microscope use
- ∞ Aseptic working methods – Laminar air flow chambers
- ∞ Using pipettes
- ∞ Using photometers
- ∞ Study of bacterial population growth
- ∞ Isolation and culture of eukaryotic cells
- ∞ Biological systems for the study of the action of chemicals and pharmaceuticals

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	***Teaching Method*** — ***Semester Workload*** Lectures — 26 Tutorial classes — 32 Study and analysis of scientific papers and book chapters — 16 Private un-supervised study — 76 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit) — 150**

STUDENT ASSESSMENT	Evaluation done in Greek 1) In laboratory work: Written and oral examination in each laboratory exercise, work assignment with analysis of the results of the laboratory exercises, final written examination on the material of the laboratory. 50% of the final grade. 2) Written exam: Multiple choice questions, pairing Qs, and Qs requiring brief reasoning and justification, 50% of the final grade The assessment criteria are presented to the students during the lectures and the tutorial classes.

5. RECOMMENDED LITERATURE

Suggested Books:

1. Lecture notes (eclass)
2. Laboratory notes and protocols (eclass)

Suggested websites:

http://www.ema.europa.eu/ema/
https://www.fda.gov/Drugs/InformationOnDrugs/ucm075234.htm
http://www.eof.gr/web/guest/publications

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UNDERGRADUATE STUDIES' COURSES

COURSE DESCRIPTION: **APPLIED MATHEMATICS**
COURSE CODE: **PHA-A13-NEW**

APPLIED MATHEMATICS
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACHY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-A13-NEW**	**SEMESTER OF STUDIES**	**1st**
COURSE TITLE	APPLIED MATHEMATICS		
INDEPENDENT TEACHING ACTIVITIES		**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures		3	5
Tutorials		1	
COURSE TYPE	General Background Course		
PREREQUISITE COURSES:	-		
TEACHING AND ASSESSMENT LANGUAGE:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Not offered		
COURSE WEBPAGE (URL)	http://www.pharmacy.upatras.gr/images/DS/PHA-A13-EN.pdf		

2. LEARNING OUTCOMES

Learning outcomes
With this course a student will become familiar with several mathematical concepts such as derivatives (total and partial) and integrals (simple, multiple and improper). He/she will get some basic knowledge of Ordinary Differential Equations (ODEs). Besides, a student realizes that phenomena which are not deterministically predictable obey probabilistic models (distributions). He/she acquires the ability to construct (interpret) appropriate graphs and calculate statistics (such as sample mean and variance) in an effort, using the sample observations, to present statistical characteristics of a random phenomenon. On successful completion of the course a student will be able to use the above mentioned mathematical concepts to solve problems, to locate critical points of two-variable functions, to solve simple optimization problems, to solve simple ODEs problems. Moreover, he/she will be able to: understand the notions of sample and the population distribution; demonstrate ability to select a distributional model for a random phenomenon.
General Abilities
∞ Adaptation to new situations ∞ Decision making ∞ Autonomous Work

- Work in an interdisciplinary environment
- Exercise of criticism and self-criticism
- Promotion of free, creative and inductive thinking

3. COURSE CONTENT

- Special functions: logarithmic, exponential, trigonometric and inverse trigonometric functions
- Improper integrals of the first and the second kind
- Functions in many variables: basic concepts, partial derivatives, double and triple integrals. Critical points and optimization methods
- Linear Algebra: Tables, determinants, systems of linear equations
- Ordinary Differential Equations (ODEs): Basic concepts and definitions, separable ODEs, exact ODEs, linear ODEs of first order, linear ODEs of second order with constant coefficients homogeneous and non-homogeneous
- Descriptive Statistics: graphical methods of data presentation, location and dispersion measures, sampling methods
- Elements of Probability Theory: definition of probability, events, conditional probability, independence, total probability theorem, Bayes' rule
- Random variables (discrete, continuous), commonly used distributions (binomial, hypergeometric, Poisson, exponential, normal), moments, central limit theorem

4. TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	Lectures (face to face)	
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	∞ In-class slides ∞ Post-class support of the course via the web page of the Department of Mathematics	
TEACHING ORGANIZATION	***Teaching Method***	***Semester Workload***
	Lectures	39
	Tutorials	13
	Solving suggested exercises	35
	Hours of personal study by the student	35
	Final examination	3
	Total number of hours for the Course **(25 hours of work-load per ECTS credit)**	**150**

STUDENT ASSESSMENT	Assessment Language: Greek Assessment Language for Erasmus students: English Assessment methods Final exams (100%) that includes ✓ Exercises Minimum passing grade: 5 Maximum passing grade: 10

5. RECOMMENDED LITERATURE

(in Greek)

- FINNEY R.L., WEIR M.D., GIORDANO F.R. *ΑΠΕΙΡΟΣΤΙΚΟΣ ΛΟΓΙΣΜΟΣ*. ΙΔΡΥΜΑ ΤΕΧΝΟΛΟΓΙΑΣ & ΕΡΕΥΝΑΣ-ΠΑΝΕΠΙΣΤΗΜΙΑΚΕΣ ΕΚΔΟΣΕΙΣ ΚΡΗΤΗΣ, 2012
- Murray R. Spiegel. *Ανώτερα Μαθηματικά*, ΕΣΠΙ ΕΚΔΟΤΙΚΗ Εταιρεία Περιορισμένης Ευθύνης, 1982.
- Χαράλαμπος Γ. Ζαγούρας, Δημήτριος Ν. Γεωργίου. *ΓΕΝΙΚΑ ΜΑΘΗΜΑΤΙΚΑ ΙΙ,* ΕΚΔΟΣΕΙΣ ΝΕΩΝ ΤΕΧΝΟΛΟΓΙΩΝ ΜΟΝ. ΕΠΕ, 2009.

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UNDERGRADUATE STUDIES' COURSES

COURSE DESCRIPTION: **CELL BIOLOGY**
COURSE CODE: **PHA-A14-NEW**

CELL BIOLOGY
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-A14-NEW**	**SEMESTER OF STUDIES**	**1st**
COURSE TITLE	CELL BIOLOGY		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	4	5

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-A14-EN.pdf

2. LEARNING OUTCOMES

Learning outcomes
New technologies are being exploited. High daily attendance at the e-class platform. This is the main introductory course in Cell Biology. The subject matter of the course aims at introducing the students to the basic concepts of Cell Biology. It also refers to the structure and chemical composition of cells, the structure and function of proteins and membranes, membrane transport and intracellular compartments and transport, cellular communication, cytoskeleton, cell growth and division and cell cycle control, and cell death, cancer cell biology, molecular mechanisms of regulation and tissues. Upon successful completion of the course, the student will be able to: • Have understood the basic concepts of Cell Biology • Have understood concepts relating to the structure and chemical composition of cells, the structure and function of proteins and membranes • Have been informed and understood about membrane transport and intracellular compartments and transport, cellular communication and cytoskeleton • Have understood the mechanisms that govern cell growth and division, cell cycle control and cell death, cancer cell biology • Have understood the molecular mechanisms of regulation and the structure of tissues

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

- Introduction to cells.
- Chemical composition of cells.
- Structure and function of proteins.
- Structure of the membranes.
- Membrane transfer.
- Intracellular compartments and transport.
- Cellular communication.
- Cytoskeleton.
- Cell growth and division.
- Cell cycle control and cell death.
- The core.
- Chromosomes and gene regulation.
- Biology of the cancer cell. Molecular regulating mechanisms.
- Tissues.

The main objectives of the course are:

- Understanding the basic concepts.
- Understanding the basic and modern technological tools and methodologies used in Cell Biology.
- Key experiments are developed that have led to fundamental discoveries in the field of Cell Biology. The goal is to develop critical thinking and ability to draw conclusions based on experimental data.
- Emphasis is given to the importance of Cell Biology for Pharmacy and Pharmaceutical Sciences.
- Examples of new drug development are developed on the basis of progress and modern discoveries in the field of Cell Biology.
- New technologies are being exploited. High daily attendance at the e-class platform.

4. TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	Lectures (amphitheater) 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	52
	Independent Study	73
	Total number of hours for the Course	
	(25 hours of work-load per ECTS credit)	**125**
STUDENT ASSESSEMNT	Evaluation Method and Criteria: The final grade is the sum of the following evaluations: I. Written Final Exam (100% or 90% for oral candidates) ∞ Written final examination on topics of growing difficulty, which broadly cover the curriculum (subject matter) developed during lectures. ∞ Topics include questions, multiple choice, short answer questions, and problems. ∞ The level of knowledge, understanding, as well as the critical ability and the ability to solve problems and to draw conclusions are examined. ∞ The final examinations of previous years are available to students at the e-class platform and/or during lectures, where they are presented in a representative manner and answered with the participation of the students. II. Group and individual work on selected/ specific topics with directed study and oral presentation (10%, voluntary) Assessment Language: Greek Assessment Language for ERASMUS students: English Written final exam including: ∞ Multiple choice questions ∞ Comprehension questions	

5. RECOMMENDED LITERATURE

Teacing Material:

1. «The Cell – A molecular approach», GM Cooper and RE Hausman
2. «Essential Cell Biology», B Alberts, D Bray, K Hopkin A Johnson, J Lewis, M Raff, K Roberts and P Walter

Suggested papers [available in eclass]:

- Hanahan D, Weinberg RA. The hallmarks of cancer: the next generation. Cell 144: 646-674, 2011 [Hanahan D, Weinberg RA. The hallmarks of cancer. Cell 100: 57-70, 2000]
  Specific Aim: To teach state-of-the art concepts pertaining to the "cancer cell" and how advances in biology can help improve therapy, e.g. tumor microenvironment (antiangiogenic and other drugs), CSCs (drug resistance), etc
- Lord CJ, Ashworth A. Biology-driven cancer drug development: back to the future. BMC Biol 8: 38, 2010
  Specific Aim: To make the connection between basic biology and drug discovery and development; this is

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COURSE DESCRIPTION: **INFORMATICS**
COURSE CODE: **PHA-A15-NEW**

INFORMATICS
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-A15-NEW**	**SEMESTER**	**1st**
COURSE TITLE	INFORMATICS		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	2	6
Tutorial	1	
Laboratory work	4	

COURSE TYPE	General Background Course
PREREQUISITE COURSES:	-
TEACHING AND ASSESSMENT LANGUAGE:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Not offered
COURSE WEBPAGE (URL)	http://www.pharmacy.upatras.gr/images/DS/PHA-A15-EN.pdf

2. LEARNING OUTCOMES

Learning outcomes
Understanding of basic principles of information systems and their applications. Basic structures of the information systems used in the health and the application of the electronic health record. Basic principles of databases and their applications in health, coding and classification of medical information. Learning of basic principles of computer networks, their applications and protection in internet. Understanding of basic principles of the medical signals and their digital processing for the export of diagnostic information. Learning of computer's software regarding word processing, spreadsheets calculations and presentation. Learning of computer's software regarding processing of experimental data. Learning of the use of Internet and the safe navigation.
General Abilities
1. Retrieve, analyze and synthesize data and information, using the necessary technologies 2. Adapt to new situations 3. Independent work

3. COURSE CONTENT

Information systems
Information systems in Health Sciences
Electronic Health Record
Databases
Coding and classification of medical information
Computer networks
Digital processing of medical signals and pictures
Introduction to Excel and the processing of experimental data
Word processing (Word)
Creating presentations (Powerpoint)
Internet browsers and email
Security of computers

4. TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	In class and in laboratory training
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Support of learning process through the online platform e-class, software for processing of experimental data and software regarding word processing, spreadsheets calculations and presentation.
TEACHING ORGANIZATION	***Teaching Method*** — ***Semester Workload*** Lectures — 26 Practical Lab Exercises — 20 Group class for data processing — 20 Autonomous study — 71 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit) — 150**
STUDENT ASSESSMENT	1. Written final exam (40%) including ∞ Questions of brief development ∞ Judgment questions 2. Laboratory exercises (60%) including ∞ Exam in basic office applications (Word, Excel, Powerpoint) and in processing of experimental data

5. RECOMMENDED LITERATURE

Suggested Books

1. Vlachopoulos Georgios & Klepetsanis Pavlos, Application of Informatics in Health Sciences, Publisher Vlachopoulos Georgios, 1st edition, 2012. (in Greek)
2. Manta John, Introduction to Informatics, Broken Hill Publishers, 1st edition, 2007. (in Greek)
3. Lister Andrew M. Introduction to Modern Computer Science, Publisher DIAVLOS S.A. Books Publisher, 5th edition, 2000. (in Greek)

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COURSE DESCRIPTION: **ENGLISH LANGUAGE AND TERMINOLOGY I**
COURSE CODE: **PHA-A16-NEW**

ENGLISH LANGUAGE AND TERMINOLOGY I
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-A16-NEW**	**SEMESTER OF STUDIES**	**1st**
COURSE TITLE	ENGLISH LANGUAGE AND TERMINOLOGY I		
INDEPENDENT TEACHING ACTIVITIES		**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures		3	2
COURSE TYPE	General Background Course		
PREREQUISITE COURSES:	-		
TEACHING AND ASSESSMENT LANGUAGE:	English		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBPAGE (URL)	http://www.pharmacy.upatras.gr/images/DS/PHA-A16-EN.pdf		

2. LEARNING OUTCOMES

Learning outcomes
By the end of this course the student will have: a) Improved their English reading skills, making feasible the studying of various text types related to their discipline, including textbook extracts, popularized articles and scientific articles. b) Developed a number of language and cognitive skills (most of which are transferable) necessary for participating in the academic discourse community, c) Further developed their language skills using the technology available in addition to classroom training. In other words they are prepared for autonomous learning.
General Abilities
Skills acquisition refers to: • Cultivation of skills in the use of English medical terminology • Developing production skills and understanding of written and spoken language • Proper pronunciation and expression • Acquiring academic writing skills • Working in an international environment • Working in an interdisciplinary environment

3. COURSE CONTENT

Grammatical structures found in medical texts including:
- ∞ Tenses
- ∞ Active and Passive Voice
- ∞ Relative clauses
- ∞ Articles
- ∞ Prepositions
- ∞ Indirect speech
- ∞ Secondary clauses

Medical text analysis
Medical terminology

4. TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	Lectures. Exercises in all four language skills: reading, writing, listening and speaking.
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Use of powerpoint and other audiovisual materials. E-class: https://eclass.upatras.gr/courses/PHA1653/
TEACHING ORGANIZATION	***Teaching Method*** ***Semester Workload*** Lectures and exercises in all four language skills: reading, writing, listening and speaking. 39 Un-supervised Study 11 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit) 50**
STUDENT ASSESSMENT	Written final exam in English including grammatical, writing and vocabulary exercises.

5. RECOMMENDED LITERATURE

English for Medicine in Higher Education Studies, Patrick Fitzgerald, Marie McCullagh, Ros Wright, Terry Phillips, Εκδόσεις Ανδρέας Μπέτσης, 2010

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COURSE DESCRIPTION: **ANALYTICAL CHEMISTRY**
COURSE CODE: **PHA-A21-NEW**

ANALYTICAL CHEMISTRY
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-A21-NEW**	**SEMESTER OF STUDIES**	**2nd**
COURSE TITLE	ANALYTICAL CHEMISTRY		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	4	5
Tutorial	2	
Laboratory courses	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-A21-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes
This course aims at acquiring knowledge, skills and competences related to Level 6 of the European Qualifications Framework for Lifelong Learning: Specifically, upon successful completion of the course, the students are expected to: 1. have valid knowledge and comprehension of the fundamental principles of Qualitative and Quantitative Analytical Chemistry 2. have acquaintance with the basic strategies of inorganic analysis and be in a position to plan new ones on demand. 3. have acquired laboratory skills concerning the basic techniques in the field, like preparation of solutions and buffers, precipitation, volumetric analysis
GENERAL ABILITIES
Data and information searching, analysis and combination, using the appropriate technologies and databases Individual work Respect and protection to the natural environment

3. COURSE CONTENT

Lectures

Introduction to Analytical Chemistry - Chemistry of Solutions

-Syllabus Concepts & Methods of Analysis
-Qualitative & Quantitative Analysis in Aqueous Chemistry
-Definitions, Applications

Inorganic Qualitative Semi-Microanalysis

- Analytical Reagents in Inorganic Qualitative Analysis
- Testing Methods
- Cation Analysis - Fresenius System
  -Reactions of selected Elements & Cations
  -Separation & Identification of Cation Groups I, II, III, IV and V

-Anion Analysis

- Methods of exclusion - Incompatible Anions.
- Reactions of characteristic anions of biological interest

Inorganic Quantitative Analysis

- Characteristics of Analytical Methods (standard solutions, linear region finding, quantification and detection limits, repeatability, accuracy, expression of results)
- Description of different types of chemical reagents and basic glassware and instruments - Calibration of volumetric utensils.
- The scales: precision and weighing errors.
- Laboratory safety: Basic rules. Good laboratory practice
- Basic techniques necessary in the chemical laboratory (sampling, solubilization, heating of solutions, filtration, washing and transfer of sediment, drying, burning, sediment formation and contamination, crystalline sedimentation techniques, titration)
- Gravimetric analysis (introduction-general analysis course-expression of results)
  - Determination of iron and aluminum
- Volumetric analysis (introductory concepts, primary and secondary standard solutions, titration, equivalent and end point titration, Different endpoint finding techniques)
  -Acid-Base titrations.
  (Determination of sodium carbonate. Analysis of a mixture of carbonates and bicarbonates)
  - Redox volumetric analysis. (Determination of oxalate with permanganate)
  - Iodimetry-Iodometry (Copper determination)
  - Precipitation volumetric analysis (Determination of chloride and silver)
  - Complexometric titrations. Ethylene diamine tetraacetic acid (EDTA) chelating agent. Determination of water' hardness

Laboratory Exercises

Introduction to the Chemical Laboratory - Instrument & Glass Handling - Safety Regulations and Measures - Precautions

General Chemistry Exercises

- Preparation of Solution-Dilution-pH Measurement
- Complexes: Preparation of Cu $(NH3)_4$ $SO_4 \bullet H_2O$, Preparation of $Ni(DMG)_2$
- Alums: Preparation & Analysis of K-Al alum

Qualitative analysis

- Cations Analysis
  - Analysis of I Analytical Group (Known & Unknown Sample), Systematic Cation Analysis
- Cations Analysis, Determination of SO_3^{2-}

Quantitative analysis -Volumetric Analysis

- Acid-Base Titrations
  -Determination of Na_2CO_3 (Known - Unknown)
  -Determination of aspirin in commercial tablets
- Complexometric Reactions
  - Water Hardness Determination (Known & Unknown Sample)

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	Face to face
Use of information and communication technologies	∞ The teaching and learning process is supported by the Upatras e-class platform. The teaching material (lectures, tutorials, laboratory experimental protocols) is uploaded and stored on the e-class and it is freely accessible to all students. ∞ Teaching process is supported by Information and Communication Technologies (ICTs).
Teaching organization	***Teaching Method*** — ***Semester Workload*** Lectures — 52 Laboratory Work + Tutorials — 36 Un-supervised study — 37 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit) — 125**
STUDENT ASSESSMENT	Assessment language: Greek 1) Assessment of learning of laboratory skills and methods by oral and written tests during laboratory sessions and final written exams with questions of development, judgment and solving of problems 2) Final Written Exams: Multiple choice questions, short answer questions and matching questions. Grade of #1 counts for 40% of the final grade.

5. RECOMMENDED LITERATURE

Suggested Books: (in greek)

1. Θ. Π. Χατζηιωάννου. Χημική Ισορροπία και Ανόργανη Ποιοτική Ημιμικροανάλυση. 6η έκδοση. Ε. Χατζηιωάννου. Αθήνα 1993
2. Θ. Π. Χατζηιωάννου. Εργαστηριακαί Ασκήσεις Ποσοτικής Αναλυτικής Χημείας 7η έκδοση Ε. Χατζηιωάννου. Αθήνα 1990
3. Ι. Στράτης, Γ. Ζαχαριάδης, Α. Βουλγαρόπουλος. Εργαστηριακές Μέθοδοι Ποσοτικής Χημικής Ανάλυσης. 1η έκδοση. Εκδόσεις Ζήτη Πελαγία και Σία Ο.Ε.. Αθήνα 2000
4. Δ.Γ. Θέμελης, Γ.Α. Ζαχαριάδης. ΑΝΑΛΥΤΙΚΗ ΧΗΜΕΙΑ.Εκδόσεις ΖΗΤΗ, Θεσσαλονίκη 1997
5. Σ. Λιοδάκης. Αναλυτική Χημεία: Θέματα και Προβλήματα. Εκδόσεις Παπασωτηρίου. Αθήνα 2001.

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

COURSE DESCRIPTION: **BIOCHEMISTRY I**
COURSE CODE: **PHA-A22-NEW**

BIOCHEMISTRY I
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-A22-NEW**	**SEMESTER OF STUDIES**	**2nd**
COURSE TITLE	BIOCHEMISTRY I		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	4	7
Laboratory courses	3	

COURSE TYPE	Scientific Field course
PREREQUISITE COURSES:	-
TEACHING AND ASSESSMENT LANGUAGE:	GREEK
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Not offered
COURSE WEBPAGE (URL)	http://www.pharmacy.upatras.gr/images/DS/PHA-A22-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes
Within the course Biochemistry I, the student deals with the study of the structure, functions and interactions of cellular and intercellular components such as proteins, sugars, lipids, nucleic acids and other biomolecules. The main objective is for the student to understand the importance of the tertiary structure of the basic biomolecules and how this knowledge leads to an understanding of their function. At the same time, however, it will also deal with genetic code, protein synthesis, substance transfer through semipermeable membranes and the transmission of electrical and / or chemical messages. The knowledge of Biochemistry I will enable him to understand Physiology, Pharmacology and deepen in Immunology, Molecular Biology-Genetics and Pharmacoekonomics.
General Abilities
Data and information searching, analysis and combination, using the appropriate technologies and databases Team Work Promote free, creative and inductive thinking

3. COURSE CONTENT

Lectures

- Introduction to Biochemistry - Biochemical processes, basic elements of chemistry
- Amino acids - peptides - proteins
- Structure, levels of organization and folding of proteins (primary-secondary-tertiary-quaternary structure)
- Protein - Genome
- Structure-function correlations in the families of proteins (antibodies, collagen, myoglobin and hemoglobin)
- Protein separation methods - protein purification and characterization
- Nucleic acids (DNA-RNA structure, structure-function relationship, therapeutic prospects-DNA vaccines)
- Bioinformatics
- Bioenergy and high energy compounds
- Enzymes (chemical nature, classification, mode of action, mechanisms, factors affecting enzymatic activity) - Enzymatic kinetics
- Biosynthesis of amino acids and nucleotides
- DNA replication and recombination
- Synthesis and processing of RNA
- Synthesis of proteins
- Gene expression control

Lab Exercises

- Introduction to the lab
- Protein electrophoresis
- DNA analysis
- Chromatography

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	Interactive teaching within a classroom
Use of information and communication technologies	∞ The teaching and learning process is supported by the Upatras e-class platform. The teaching material (lectures, tutorials, laboratory experimental protocols) is uploaded and stored on the e-class and it is freely accessible to all students. ∞ Teaching process is supported by Information and Communication Technologies (ICTs).
Teaching organization	***Teaching Method*** — ***Semester Workload*** Lectures — 52 Laboratory Work + Tutorials — 39 Un-supervised study — 84 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit)** — **175**

STUDENT ASSESSMENT	Assessment language: Greek Evaluation of the students is carried out through written examination at the end of the semester and oral evaluation during the laboratory courses. Written examination and oral evaluation is carried out in Greek language. Written examination includes the description for a number of theory topics and multiple-choice exercises.

5. RECOMMENDED LITERATURE

Suggested Books: (in greek)
Jeremy Berg, John Tymoczko and Lubert Stryer, ΒΙΟΧΗΜΕΙΑ
R. Ochs, Βιοχημεία, Εκδόσεις ΠΑΡΙΣΙΑΝΟΥ

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

COURSE DESCRIPTION: **MORPHOLOGY OF HUMAN BODY**
COURSE CODE: **PHA-A23-NEW**

MORPHOLOGY OF HUMAN BODY
COURSE DESCRIPTION

1. GENERAL

SCHOOL	SCHOOL OF HEALTH SCIENCES		
DEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-A23-NEW**	**SEMESTER OF STUDIES**	**2nd**
COURSE TITLE	MORPHOLOGY OF HUMAN BODY		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	3	4

COURSE TYPE	General Background Course
PREREQUISITE COURSES:	-
TEACHING AND ASSESSMENT LANGUAGE:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Not offered
COURSE WEBPAGE (URL)	http://www.pharmacy.upatras.gr/images/DS/PHA-A23-EN.pdf

2. LEARNING OUTCOMES

Learning outcomes
The Morphology of Human Body course includes teaching of the basic principles of Systematic Anatomy necessary for Pharmacy Students. At the end of the course the students should be able to use the acquired knowledge in order to: 1. Understand the basic anatomical terms in order to communicate with Physicians 2. Understand the basic anatomic principles of disease related to different systems and regions of the body 3. Combine basic Anatomical knowledge with relevant knowledge in other Medical and Pharmaceutical topics 4. Analyze and synthesize anatomical information of the patient with relevant pharmaceutical interventions in simple clinical problem settings (Problem-Based Learning)
General Abilities
Generally, by the end of this course the student will have developed the following general abilities: Searching, analysis and synthesis of facts and information, as well as using the necessary technologies Decision making Autonomous (Independent) work Group work Development of research ideas

3. COURSE CONTENT

- Introduction to Human Anatomy
- The musculoskeletal system
- The respiratory system
- The cardiovascular system
- The endocrine system
- The gastrointestinal system
- The nervous system
- The urinary system
- The male genital system
- The female genital system
- The skin and breast

4. TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	Lectures face to face
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Use of Information and Communication Technologies (ICTs) (e.g. powerpoint presentations) in teaching. The lectures content of the course for each chapter are uploaded on the internet (e-class platform), in the form of a series of ppt files, where from the students can freely download them using a password which is provided to them at the beginning of the course.
TEACHING ORGANIZATION	***Teaching Method*** — ***Semester Workload*** Lectures — 39 Un-supervised study — 61 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit) — 100**
STUDENT ASSESSMENT	Written exams at the end of the semester. Examination includes MCQs, short essays and Clinical Problem solving. Minimum passing grade: 5/10.

5. RECOMMENDED LITERATURE

Suggested Literature *(in Greek)* ***:***

1st Choice
Color atlas of human anatomy (Greek translation)
Platzer, Fritsch, Kuhnel, Kahle, Frotscher
Broken Hill Publishers Ltd
Έκδοση: Δεύτερη (2η)
Έτος έκδοσης: 2011
Κωδικός Βιβλίου στον Εύδοξο: 13256819

2nd Choice
Clinical Anatomy (Greek translation)
Snell Richard
Εκδοτικός οίκος: K. & N. Λίτσας Ο.Ε
Έκδοση: Πρώτη (1η)
Έτος έκδοσης: 2009
Κωδικός Βιβλίου στον Εύδοξο: 25208

3rd Choice
Anatomy at a Glance (Greek translation)
Omar Faiz, Simon Blackburn, David Moffat
Έκδοση: 3η
Εκδοτικός οίκος: Παρισιάνου Ανώνυμη Εκδοτική Εισαγωγική Εμπορική Εταιρεία Επιστημονικών Βιβλίων

4th Choice
Gray's Anatomy (1,2) (Greek translation)
Drake Richard L.,Vogl Wayne,Mitchell Adam W. M.
Broken Hill Publishers Ltd
Έκδοση: Δεύτερη (2η)
Έτος έκδοσης: 2006
Κωδικός Βιβλίου: 13256927

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

COURSE DESCRIPTION: **ORGANIC CHEMISTRY**
COURSE CODE: **PHA-A24-NEW**

ORGANIC CHEMISTRY
COURSE DESCRIPTION

1. GENERAL

SCHOOL	SCHOOL OF HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-A124- NEW**	**SEMESTER OF STUDIES**	**2nd**
COURSE TITLE	ORGANIC CHEMISTRY		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	4	6
Tutorials	2	

COURSE TYPE	General Background 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-A24-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes
After taking this Course the student is supposed to acquire the basic skills in organic chemistry which will enable him/her to go on and take the three following Medicinal Chemistry Courses (I, II & III) included in the undergraduate curriculum of the Department of Pharmacy, University of Patras.
General Abilities
Inquiry, Analysis and Synthesis of all data and information by employing all the necessary technologies Adjustment to new challenges and Situations Ability to to take Decisions Independent Work Work Design and Management Promotion of free, creative, and inductive Thinking Ability

3. COURSE CONTENT

Atomic Structure, Orbitals, Theory of Chemical Bonding, Tetrahedral Nature of Carbon Hybridized Orbitals & Double and Triple Bonds, Formal Charges, Lewis Structures, Resonance, Acids & Bases according to Brönsted-Lowry and Lewis

Alkanes & Cycloalkanes, Functional Groups and Constitutional Isomerism, Stereochemistry I, Conformations of Ethane, Butane & Cyclohexane, Reaction Mechanisms, Rates and Equilibria of Organic Reactions Alkenes & Alkynes, Special Acidity of Alkynes, Introduction to Organic Synthesis, Stereochemistry II, Stereoisomerism and Fischer Projections Alkyl Halides and S_N (Substitution) & E (Elimination) Reactions, Conjugated Dienes & Diels-Alder Reaction Benzene & Aromaticity, Aromatic Ions, Electrophilic Aromatic substitution Alcohols, Amines, Ethers & Epoxides, Hydrogen Bonding, Alcohol Protection, Williamson Synthesis of Ethers, Hofmann Rearrangement & Elimination, Alkaloids & Morphine Rule

4. TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	Classroom Teaching	
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	E-Class	
TEACHING ORGANIZATION	***Teaching Method***	***Semester Workload***
	Lectures	52
	Tutorials	26
	Un-supervised study	72
	Total number of hours for the Course	
	(25 hours of work-load per ECTS credit)	**150**
STUDENT ASSESSMENT	Written exams in Greek (also possible in English) Multiple choice questions, Short Response Questions	

5. RECOMMENDED LITERATURE

Suggested Books:
1. Organic Chemistry, John McMurry ISBN: 978-960-524-491-0 (Greek translation)
2. In Greek: Organic Chemistry, 1st Ed./2005, Varvoglis Anastasios, ISBN: 960-431-948-5

Relevant Journals:
Journal of Organic Chemistry, Organic Letters, Journal of the American Chemical Society, Synthesis, Synlett, European Journal of Organic Chemistry, Tetrahedron Letters, Tetrahedron.

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

COURSE DESCRIPTION: **PHYSIOLOGY I**
COURSE CODE: **PHA-A25-NEW**

PHYSIOLOGY I
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-25-NEW**	**SEMESTER OF STUDIES**	**2nd**
COURSE TITLE	PHYSIOLOGY I		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	4	6

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-A25-EN.pdf

2. LEARNING OUTCOMES

Learning outcomes
In general, this class ambitions to facilitate the acquisition of knowledge, skills and capabilities at the level 6 of the European Framework of Skills of Lifelong Learning. In particular, upon completion, it aims to provide students with the following: - Understand the notions of Homeostasis, Excitation and Cellular signaling, and the physiological function of distinct physiological systems in humans (Musculoskeletal, Nervous, Cardiovascular and Urinary) - Understand the basic notions of electrocardiography - Acquire a demonstrable knowledge and understanding of the knowledge area of Human Physiology, supported by the use of textbooks of advanced level and by additional data derived from recent developments at the forefront of this field. - Be able to use the acquired knowledge and understanding 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. Anatomy, Biochemistry) - Be able to approach complex novel problems related to pathophysiological situations - 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 though towards others and themselves
Development of free, creative and inductive thinking

3. COURSE CONTENT

- Basic notions of human physiology
- The acqeous environment in the body, homeostasis
- Basic cellular functions, the movement of molecules through cellular membranes
- Respiratory system mechanisms of breathing, gas exchange and movement
- Blood-forming system: Composition and function of blood, Coagulation and Hemostasis, Introduction to the Immune system
- The gastrointestinal tract: anatomical elements, secretions, digestion and absorbance of food in the GI, feeding and metabolism
- The endocrine glands/tissues and their secretory function, control of metabolism and of body growth and energy homeostasis. Reproductory functions in males and females.

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 & manage their tasks Use of PCs in teaching
TEACHING ORGANIZATION	***Teaching Method*** ***Semester Workload*** Lectures 52 Personal (to each student) time for studying 98 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit) 150**
STUDENT ASSESSMENT	Evaluation done in greek Written exam: Multiple choice questions, pairing Qs, and Qs requiring brief reasoning and justification, 100% of the final grade

5. RECOMMENDED LITERATURE

Manual/Textbook: *(*Greek translation)

BERNE AND LEVY Φυσιολογία Συγγραφείς: Koeppen, Stanton, Εκδοτικός οίκος: Παρισιάνου Ανώνυμη Εκδοτική Εισαγωγική Εμπορική Εταιρεία Επιστημονικών Βιβλίων, 2012

Ιατρική Φυσιολογία I, Boron W. & Boulpaep E., Εκδόσεις: Broken Hill Publishers Ltd, 2011

Εισαγωγή στη Φυσιολογία του Ανθρώπου. Από τα συστήματα στα κύτταρα, Lauralee Sherwood, Ακαδημαϊκές Εκδόσεις Ι. Μπάσδρα και ΣΙΑ Ο.Ε., 2016

Journals: Physiological Reviews

Sites: http://www.the-aps.org/

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

COURSE DESCRIPTION: **ENGLISH LANGUAGE AND TERMINOLOGY II**
COURSE CODE: **PHA-A26-NEW**

ENGLISH LANGUAGE AND TERMINOLOGY II
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-A26-NEW**	**SEMESTER OF STUDIES**	**2nd**
COURSE TITLE	ENGLISH LANGUAGE AND TERMINOLOGY II		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	3	2

COURSE TYPE	General Background Course
PREREQUISITE COURSES:	-
TEACHING AND ASSESSMENT LANGUAGE:	English
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBPAGE (URL)	http://www.pharmacy.upatras.gr/images/DS/PHA-A26-EN.pdf

2. LEARNING OUTCOMES

Learning outcomes
By the end of this course the student will have: a) Improved their English reading skills, making feasible the studying of various text types related to their discipline, including textbook extracts, popularized articles and scientific articles. b) Developed a number of language and cognitive skills (most of which are transferable) necessary for participating in the academic discourse community, c) Further developed their language skills using the technology available in addition to classroom training. In other words they are prepared for autonomous learning.
General Abilities
Skills acquisition refers to: • Cultivation of skills in the use of English medical terminology • Developing production skills and understanding of written and spoken language • Proper pronunciation and expression • Acquiring academic writing skills • Working in an international environment • Working in an interdisciplinary environment

3. COURSE CONTENT

This course focuses on the introduction of medical terminology using a medical word parts approach as well as in the description of organs and other structures of the human body.

Introduction to medical terminology

- Medical word parts (prefixes/suffixes/roots)
- Term formation
- Spelling words derived from Greek and Latin
- Greek and Latin plurals
- Pronunciation rules

Introduction to basic anatomical terms. Describing structure and function of anatomical parts.

- Anatomical terms
- Layman's and medical terms
- Greek and Latin noun suffixes
- Adjectival and diminutive suffixes
- Range of motion
- Practice with verbs
- Describing structure and functions of systems and organs
- Word parts concerned with color

Describing shapes and properties of various organs and structures in the human body.

- Shapes and properties

Describing location of various organs and structures in the human body

- Anatomical terms
- Locative prefixes
- Locative prepositions

Medical text analysis

4. TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	Lectures. Exercises in all four language skills: reading, writing, listening and speaking.
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Use of powerpoint and other audiovisual materials. E-class: https://eclass.upatras.gr/courses/PHA1653/
TEACHING ORGANIZATION	***Teaching Method*** ***Semester Workload*** Lectures and exercises in all four language skills: reading, writing, listening and speaking. 39 Private Study 11 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit)** **50**
STUDENT ASSESSMENT	Written final exam in English including grammatical, writing and vocabulary exercises.

5. RECOMMENDED LITERATURE

Αγγλική ορολογία για επιστήμονες υγείας, Γιώργος Ι. Πανουτσόπουλος, ΔΙΣΙΓΜΑ ΕΚΔΟΣΕΙΣ, 2016

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

COURSE DESCRIPTION: **BIOCHEMISTRY II**
COURSE CODE: **PHA-B11-NEW**

BIOCHEMISTRY II
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-B11-NEW**	**SEMESTER OF STUDIES**	**3rd**
COURSE TITLE	BIOCHEMISTRY II		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	4	7
Laboratory courses	3	

COURSE TYPE	Scientific Field course
PREREQUISITE COURSES:	-
TEACHING AND ASSESSMENT LANGUAGE:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Not offered
COURSE WEBPAGE (URL)	http://www.pharmacy.upatras.gr/images/DS/PHA-B11-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes
A living organism requires thousands of coordinated chemical reactions. In this course we will study the major integrated metabolic pathways of living cells and whole organisms, with particular attention to enzyme mechanisms, as well as the regulation, and integration of metabolism from the molecular to the whole organism level. The synthesis and degradation of carbohydrates, amino acids, lipids, and nucleotides are investigated, along with the mechanisms of energy flow and cell-to-cell communication. While common metabolic processes are emphasized, unique aspects of metabolism that permit cells to function in unusual niches will also be considered.
General Abilities
Data and information searching Analysis and combination, Using the appropriate technologies and databases Team Work Promote free, creative and inductive thinking

3. COURSE CONTENT

Lectures

- Biological membranes (structure, function, principles of membrane transport, channels and resources)
- The immune system
- Sensor systems
- Introduction to Steroid Hormones – Cholesterol
- Carbohydrates, carbohydrate metabolism
- KREBS cycle
- Biological oxidations
- The Calvin cycle and the course of phosphate pentoses
- Metabolism of fatty acids
- Complete Metabolism

Lab Exercises

- Introduction to the lab
- Chromatography
- Quantification of proteins
- ELISA

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	Interactive teaching within a classroom
Use of information and communication technologies	∞ The teaching and learning process is supported by the Upatras e-class platform. The teaching material (lectures, tutorials, laboratory experimental protocols) is uploaded and stored on the e-class and it is freely accessible to all students. ∞ Teaching process is supported by Information and Communication Technologies (ICTs).
Teaching organization	***Teaching Method*** — ***Semester Workload*** Lectures — 52 Laboratory Work + Tutorials — 39 Un-supervised study — 84 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit)** — **175**
STUDENT ASSESSMENT	Assessment language: Greek Evaluation of the students is carried out through written examination at the end of the semester and oral evaluation during the laboratory courses. Written examination and oral evaluation is carried out in Greek language. Written examination includes the description for a number of theory topics and multiple-choice exercises. Evaluation criteria and rules are presented to the students at the beginning of the theory courses and laboratory training courses.

5. RECOMMENDED LITERATURE

Suggested Books: (in greek)
Jeremy Berg, John Tymoczko and Lubert Stryer, Biochemistry
R. Ochs, Biochemistry, ED. Parisianos

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

COURSE DESCRIPTION: **SYNTHETIC ORGANIC CHEMISTRY**
COURSE CODE: **PHA-B12-NEW**

SYNTHETIC ORGANIC CHEMISTRY
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-B12-NEW**	**SEMESTER OF STUDIES**	**3rd**
COURSE TITLE	SYNTHETIC ORGANIC CHEMISTRY		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	4	8
Tutorials	2	
Laboratory Course	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-B12-EN.pdf

2. LEARNING OUTCOMES

Learning outcomes
This course aims at acquiring knowledge, skills and competences related to Level 6 of the European Qualifications Framework for Lifelong Learning. In particular, the present course aims to introduce students to the field of Organic Synthesis, which is related with the synthesis and chemical transformations of organic compounds. Upon successful completion of the course: 1. The students will be able to present and apply the basic synthetic methodologies for the interconversion of common functional groups, the construction of the carbon skeleton of organic compounds via C-C coupling reactions, as well as the synthesis of cyclic compounds from acyclic precursors/reagents. 2. They will be able to present and apply the basic principles of Organic Synthesis as well as the modern methodologies published in related textbooks and scientific journals. 3. They will be able to combine and apply the acquired knowledge to solve Organic Synthesis problems and suggest syntheses of already known or new bioactive compounds.

4. They will have acquired laboratory skills related to the application of Organic Synthesis techniques for the synthesis of simple organic compounds. Specifically, the students will be trained on how to set up, perform and work up organic reactions (handling of apparatuses and chemical reagents, preparation of anhydrous solvents), on the purification, isolation and identification techniques (distillation, extraction, filtration, thin layer chromatography, column chromatography, recrystallization, melting point determination) as well as on the use of related scientific equipment.
5. They will have acquired abilities to comprehend and solve interdisciplinary problems that involve organic synthesis issues.
6. They will have developed study skills necessary for their further scientific training and professional development

General Abilities

Data and information searching, analysis and combination, using the necessary technologies
Independent work
Team-work
Work in an international environment
Work in an interdisciplinary environment
Generation of new research ideas

3. COURSE CONTENT

Lectures-Tutorials

- Preparation and interconversion of functional groups
- C-C coupling reactions
- Methods for the synthesis of cyclic compounds

Laboratory course:

- Safety rules and procedures in the Organic Chemistry Laboratory. Glasseware, apparatuses and laboratory equipment, guidelines for keeping records of laboratory work.
- Synthesis of hexan-2-ol from hex-1-ene
- Synthesis of acetanilide
- Synthesis of benzophenone
- Synthesis of caprolactam
- Synthesis of ethyl acetoacetate ethylene acetal
- Aldol condensation of benzaldehyde with acetone

4. TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	Face to face.
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	- The teaching and learning process is supported by the Upatras e-class platform. The teaching material (lectures, tutorials, laboratory experimental protocols) is uploaded and stored on the e-class and it is freely accessible to all students. - Teaching process is supported by Information and Communication Technologies (ICTs).

TEACHING ORGANIZATION	***Teaching Method***	***Semester Workload***
	Lectures	52
	Tutorials	26
	Laboratory work	18
	Private, unsupervised study	104
	Total number of hours for the Course **(25 hours of work-load per ECTS credit)**	**200**
STUDENT ASSESSMENT	Assessment language: Greek Lectures-Tutorials 1) Written exams: Multiple choice questions, matching questions and problem solving (70% of the final grade). Laboratory Course 2) Oral and written tests during the laboratory sessions, individual and teamwork laboratory projects and final written exams (multiple choice questions, problem solving) (30% of the final grade).	

5. RECOMMENDED LITERATURE

Suggested Books:

1. D. Papaioannou, "*Synthetic Organic chemistry*", in Greek language only, Papazisis Publications, 1995.
2. Anastasios G. Varvoglis, "*Organic Chemistry*", Ziti Pelagia Publications, 2005.
3. J. McMurry, "*Organic Chemistry*", Translation to Greek: A. Varvoglis, M. Orfanopoulos, I. Smonou et al, University of Crete Publications, 2012.
4. Jonathan Clayden, Nick Geeves, Stuart Warren, "*Organic Chemistry*", 2nd Edition, Oxford University Press, 2012.
5. K. C. Nicolaou and E. J. Sorensen, "*Classics in Total Synthesis*", VCH, 1996.
6. S. Nikolaropoulos, "*Synthetic Organic Chemistry Experiments*", (Laboratory Handout).

Scientific Journals:

Angewandte Chemie International Edition,
The Journal of Organic Chemistry,
Journal of the American Chemical Society,
Organic Letters,
Chemical Reviews,
Tetrahedron
Tetrahedron Letters
European Journal of Organic Chemistry,
Asian Journal of Organic Chemistry,
Synthesis,

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

COURSE DESCRIPTION: **PHYSICAL CHEMISTRY**
COURSE CODE: **PHA-B13-NEW**

PHYSICAL CHEMISTRY
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-B13-NEW**	**SEMESTER**	**3rd**
COURSE TITLE	PHYSICAL CHEMISTRY		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	4	7
Laboratory practice	3	

COURSE TYPE	General Background course
PREREQUISITE COURSES:	-
TEACHING AND ASSESSMENT LANGUAGE:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Not offered
COURSE WEBPAGE (URL)	http://www.pharmacy.upatras.gr/images/DS/PHA-B13-EN.pdf

2. LEARNING OUTCOMES

Learning outcomes

The course is the basic introduction to the concepts of Physical Chemistry and their application to physical and chemical processes. It also applies to some simple pharmaceutical and biological systems.

Specifically, it develops a) the methodology of extracting mathematical relationships from a series of experimental data for ideal and real gases, b) the methodology of extracting mathematical relationships from a simple theoretical systems setting some basic principles and assumptions and the confirmation or rejection of mathematical relationships through experimental design.

Understanding

a) the basic principles of Thermodynamics in simple systems, the changes of thermodynamic parameters during the interactions of simple systems and the conditions that lead to spontaneous changes and in a state of equilibrium
b) the basic principles of phases equilibrium, the phase change conditions of matter in simple and binary systems and their application to physical processes (distillation, sublimation, crystallization, lyophilization)
c) the basic principles of chemical thermodynamics and thermochemistry and their application in aqueous chemical systems (pH, buffer solutions, dissociation of strong and weak electrolytes)
d) the basic principles of chemical kinetics and their application in stability and degradation of active pharmaceutical ingredients in pharmaceutical formulations and
e) the basic principles of electrochemistry (conductivity of solutions, activities in electrolyte solutions, electrical double-layer, electrode potentials, electrochemical equilibrium, Nernst equation, reference electrodes, membrane potentials, glass electrode).

General Abilities
1. Analyze and synthesize data and information, using the necessary technologies 2. Independent work 3. Group work

3. COURSE CONTENT

i. Empirical properties of gases
ii. Kinetic theory of gases
iii. Basic concepts and laws of Thermodynamics
iv. Equilibrium of Phases
v. Chemical equilibrium and Thermochemistry
vi. Chemical Kinetics
vii. Electrochemistry

4. TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	In class and laboratory on hands training
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Support of learning process through the online platform e-class, Software for data acquisition during laboratory experiments and software for processing of experimental data.
TEACHING ORGANIZATION	***Teaching Method*** — ***Semester Workload*** Lectures — 52 Practical Lab Exercises — 18 Group lab reports and presentations — 40 Autonomous study — 65 ***Total Courses load*** **(25 ώρες φόρτου εργασίας ανά πιστωτική μονάδα) — 175**
STUDENT ASSESSMENT	1. Written final examination (70%) including ∞ Questions of brief development ∞ Judgment questions ∞ Problems solving 2. Laboratory exercises (30%) including ∞ Examination on laboratory practices ∞ Presentation of group work for each laboratory exercise (processing of experimental data – development of final results) ∞ Written exam

5. RECOMMENDED LITERATURE

1) N. A. Katsanos, Physical Chemistry – Basic Principles, Publisher PAPAZISIS, 3rd edition - completed, 1993 (in Greek)
2) Atkins Peter & De Paula Julio, Physical Chemistry (translation of 9th English edition), Crete University Press, 2014 (in Greek)

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

COURSE DESCRIPTION: **PHYSIOLOGY II**
COURSE CODE: **PHA-B14-NEW**

PHYSIOLOGY II
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-B14-NEW**	**SEMESTER OF STUDIES**	**3rd**
COURSE TITLE	PHYSIOLOGY II		
INDEPENDENT TEACHING ACTIVITIES		**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures		4	6
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-B14-EN.pdf		

2. LEARNING OUTCOMES

Learning outcomes
In general, this class ambitions to facilitate the acquisition of knowledge, skills and capabilities at the level 6 of the European Framework of Skills of Lifelong Learning. In particular, upon completion, it aims to provide students with the following: - Understand the notions of Homeostasis, Excitation and Cellular signaling, and the physiological function of distinct physiological systems in humans (Musculoskeletal, Nervous, Cardiovascular and Urinary) - Understand the basic notions of electrocardiography - Acquire a demonstrable knowledge and understanding of the knowledge area of Human Physiology, supported by the use of textbooks of advanced level and by additional data derived from recent developments at the forefront of this field. - Be able to use the acquired knowledge and understanding 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. Anatomy, Biochemistry) - Be able to approach complex novel problems related to pathophysiological situations - 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 though towards others and themselves Development of free, creative and inductive thinking

3. COURSE CONTENT

- Excitability
- Musculoskeletal system
- Nervous system, basic elements and structures
- Functions of the nervous system
- Heart and Vessels – Structure and Function
- Urinary tract, functions of the kidneys

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 & manage their tasks Use of PCs in teaching
TEACHING ORGANIZATION	***Teaching Method*** ***Semester Workload*** Lectures 52 Personal (to each student) time for studying 98 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit) 150**
STUDENT ASSESSMENT	Evaluation done in greek Written exam: Multiple choice questions, pairing Qs, and Qs requiring brief reasoning and justification, 100% of the final grade

5. RECOMMENDED LITERATURE

Manual/Textbook: *(*Greek translation)

BERNE AND LEVY Φυσιολογία Συγγραφείς: Koeppen, Stanton, Εκδοτικός οίκος: Παρισιάνου Ανώνυμη Εκδοτική Εισαγωγική Εμπορική Εταιρεία Επιστημονικών Βιβλίων, 2012

Ιατρική Φυσιολογία I, Boron W. & Boulpaep E., Εκδόσεις: Broken Hill Publishers Ltd, 2011

Εισαγωγή στη Φυσιολογία του Ανθρώπου. Από τα συστήματα στα κύτταρα, Lauralee Sherwood, Ακαδημαϊκές Εκδόσεις Ι. Μπάσδρα και ΣΙΑ Ο.Ε., 2016

Journals: Physiological Reviews

Sites: http://www.the-aps.org/

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

COURSE DESCRIPTION: **ENGLISH LANGUAGE AND TERMINOLOGY III**
COURSE CODE: **PHA-B15-NEW**

ENGLISH LANGUAGE AND TERMINOLOGY III
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-B15-NEW**	**SEMESTER OF STUDIES**	**3rd**
COURSE TITLE	ENGLISH LANGUAGE AND TERMINOLOGY III		
INDEPENDENT TEACHING ACTIVITIES		**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures		3	2
COURSE TYPE	General Background course		
PREREQUISITE COURSES:	-		
TEACHING AND ASSESSMENT LANGUAGE:	English		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBPAGE (URL)	http://www.pharmacy.upatras.gr/images/DS/PHA-B15-EN.pdf		

2. LEARNING OUTCOMES

Learning outcomes
By the end of this course the student will have: a) Improved their English reading skills, making feasible the studying of various text types related to their discipline, including textbook extracts, popularized articles and scientific articles. b) Developed a number of language and cognitive skills (most of which are transferable) necessary for participating in the academic discourse community, c) Further developed their language skills using the technology available in addition to classroom training. In other words they are prepared for autonomous learning.
General Abilities
Skills acquisition refers to: • Cultivation of skills in the use of English medical terminology • Developing production skills and understanding of written and spoken language • Proper pronunciation and expression • Acquiring academic writing skills • Working in an international environment • Working in an interdisciplinary environment

3. COURSE CONTENT

Study and analysis of medical texts on topics including:

- Symptoms of disease
- Pain
- Diseases
- Treatment of disease
- Immunity
- Case histories
- The physical examination
- Diagnostic and symptomatic suffixes

4. TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	Lectures. Exercises in all four language skills: reading, writing, listening and speaking.
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Use of powerpoint and other audiovisual materials. E-class
TEACHING ORGANIZATION	***Teaching Method*** ***Semester Workload*** Lectures and exercises in all four language skills: reading, writing, listening and speaking. 39 Un-supervised Study 11 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit)** **50**
STUDENT ASSESSMENT	Written final exam in English including grammatical, writing and vocabulary exercises.

5. RECOMMENDED LITERATURE

Collins COBUILD ADVANCED LEARNER'S DICTIONARY Εκδόσεις Ανδρέας Μπέτσης, 2015

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

COURSE DESCRIPTION: **BIOETHICS - ELEMENTS OF DRUG REGULATION**
COURSE CODE: **PHA-B21-NEW**

BIOETHICS - ELEMENTS OF DRUG REGULATION
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-B21-NEW**	**SEMESTER OF STUDIES**	**4th**
COURSE TITLE	BIOETHICS - ELEMENTS OF DRUG REGULATION		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	3	6

COURSE TYPE	Scientific Field course
PREREQUISITE COURSES:	-
TEACHING AND ASSESSMENT LANGUAGE:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Not offered
COURSE WEBPAGE (URL)	http://www.pharmacy.upatras.gr/images/DS/PHA-B21-EN.pdf

2. LEARNING OUTCOMES

Learning outcomes
Students learn and understand the issues and importance of Bioethics as well as the Basic Principles of Legislation, adapted to the science of Pharmacy. Students acquire the necessary knowledge to understand the legal, ethical and ethical framework governing the research, development and marketing of health products, as well as the regulatory framework for the profession of pharmacist. At the end of the course, students are able to use the knowledge and understanding they have gained so that they can in future (in their professional rehabilitation) better approach the role (profession) of both the Pharmacist and other professional directions such as preclinical & clinical research, vigilance (safety), marketing approvals. Students are also able to recognize the great importance of collaborating pharmacists, clinicians, laboratory and nursing staff and lawyers with the aim of describing, monitoring and continuously renewing the rules on the optimal way of developing and marketing health products, understanding the complex scientific, legal and ethical challenges.
General Abilities
Data and information searching, analysis and combination, using the necessary technologies Independent work Team-work Work in an international environment

Work in an interdisciplinary environment Generation of new research ideas

3. COURSE CONTENT

Drug discovery and development

- Research and Ethics in Research
- Animal experiment rules and guidelines
- Human Research: Rules of Good Clinical Practice

Nuremberg Code

Declaration of Geneva

Declaration of Helsinki (Original text, revisions, modern wording)

Genetic and prognostic genomics

Genetics and society

Regulatory Framework for Marketing Authorizations for Medicines and Health Products

- Drugs
- Medicinal products of natural origin
- Medical equipment
- Cosmetics

Pharmacovigilance and Medical Devices Vigilance

Death and moral issues about death

Pharmaceutical Law (Pharmacy Operation)

4. TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	Lectures Face to face
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	∞ The teaching and learning process is supported by the Upatras e-class platform. The teaching material (lectures, tutorials, laboratory experimental protocols) is uploaded and stored on the e-class and it is freely accessible to all students. ∞ Teaching process is supported by Information and Communication Technologies (ICTs).
TEACHING ORGANIZATION	***Teaching Method*** — ***Semester Workload*** Lectures — 39 Private, unsupervised study — 111 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit) — 150**
STUDENT ASSESSMENT	Written examination at the end of the courses, including topic development and answers to multiple choice questions

5. RECOMMENDED LITERATURE

Suggested Books:

Alachiotis S. “Bioethics” in Greek language only, Livanis Publications, 2011

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

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

COURSE DESCRIPTION: **PHARMACEUTICAL MICROBIOLOGY AND IMMUNOLOGY**
COURSE CODE: **PHA-B23-NEW**

PHARMACEUTICAL MICROBIOLOGY AND IMMUNOLOGY
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-B23-NEW**	**SEMESTER OF STUDIES**	**4th**
COURSE TITLE	PHARMACEUTICAL MICROBIOLOGY AND IMMUNOLOGY		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	4	7
Laboratory practice	1	

COURSE TYPE	Scientific Field course
PREREQUISITE COURSES:	-
TEACHING AND ASSESSMENT LANGUAGE:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Not offered
COURSE WEBPAGE (URL)	http://www.pharmacy.upatras.gr/images/DS/PHA-B23-EN.pdf

2. LEARNING OUTCOMES

Learning outcomes
In the framework of the course of Pharmaceutical Microbiology, the student deals with the study of the introductory elements of Microbiology and Immunology. In particular, the student studies the cellular structure of prokaryotic and eukaryotic organisms, the chemical composition, the manipulation of microorganisms at clinical and laboratory level, the basic elements of bacteria, fungi, viruses e.t.c. At the same time it deals with the study of Immune system and its mechanisms. In particular, we study Physical and Adoptive Immunity, the basic organs and tissues of the body that express it, the basic cells that are involved in and contribute to defense against pathogens. In addition, the student is introduced into the concept of Autoimmunity. This knowledge will enable him to understand the Pharmacology and Therapeutics of these diseases.
General Abilities
∞ Data search and mining ∞ Data evaluation using modern tools and methods ∞ Independent thinking and work ∞ Collaborative work and joint research efforts ∞ Work in a competitive environment ∞ Work in an interdisciplinary scientific environment

3. COURSE CONTENT

Introduction to microbiology: history, evolution, classification, structure, definitions

- Methods to be used and organisms in microbiology
- Microbial growth - kinetics
- Food and energy
- Microbial growth and control
- Cell/microbes culture
- Diseases and epidemiology
- Fungi: morphology, classification, drugs
- Viruses: structure of viruses, classification
- Bacteria: morphology, classification, infectious diseases

Introduction to the immune system

- ∞ Introduction to Molecular Genetics
- ∞ natural immunity
- ∞ antigen uptake and presentation
- ∞ antigen recognition
- ∞ cellular immune responses
- ∞ active mechanisms of cellular immunity
- ∞ humorous immune responses
- ∞ active mechanisms of humoral immunity
- ∞ immune tolerance and autoimmunity
- ∞ immune responses against tumors and transplants
- ∞ hypersensitivity
- ∞ immunodeficiencies

4. TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	Interactive teaching within a classroom
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Use of modern technologies, web-based applications and software in laboratory training and in the communication with students.
TEACHING ORGANIZATION	***Teaching Method*** — ***Semester Workload*** Theoretical courses — 52 Tutorial — 13 Independent study — 110 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit)** — **175**
STUDENT ASSESSMENT	Evaluation of the students is carried out through written examination at the end of the semester. Written examination is carried out in Greek language. Written examination includes the description for a number of theory topics and multiple-choice exercises. Evaluation criteria and rules are presented to the students at the beginning of the theory courses and laboratory training courses.

5. RECOMMENDED LITERATURE

Suggested Books:

General Microbiology, A. Karagouni-Kyrtsoy, Ed. Stamoulis

Basic Immunology, Abba, Ed. Pashalidis

General Microbiology, Kalkani-Bousiakou, Ed. ELLIN

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

COURSE DESCRIPTION: **PHYSICAL PHARMACY**
COURSE CODE: **PHA-B24-NEW**

PHYSICAL PHARMACY
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-B24-NEW**	**SEMESTER OF STUDIES**	**4th**
COURSE TITLE	PHYSICAL PHARMACY		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	4	8
Laboratory practice	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-B24-EN.pdf

2. LEARNING OUTCOMES

Learning outcomes
Understanding of relationships of drugs physicochemical properties with their a) solubility in aqueous media and b) distribution in biological membranes. Application of techniques for improvement of drugs solubilization in aqueous media. Basic principles of surface and interfacial phenomena and their application in pharmaceutical and biological systems. Understanding of basic physicochemical properties of colloidal systems and coarse dispersions (suspensions, emulsions, microemulsions, hydrogels) and their applications as drugs carriers. Basic principles of Rheology and rheological properties of pharmaceutical formulations.
General Abilities
∞ Self-study ∞ Group work ∞ Analyze and synthesize data and information, using the necessary technologies ∞ Work in interdisciplinary environment

3. COURSE CONTENT

1. Solubility and distribution of drugs
2. Complexation and protein binding with drugs
3. Interfacial Phenomena
4. Colloidal Systems
5. Rheology
6. Coarse Dispersions

4. TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	In class and laboratory on hands training
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Support of learning process through the online platform e-class. Software for data acquisition during laboratory experiments and software for processing of experimental data.
TEACHING ORGANIZATION	***Teaching Method*** — ***Semester Workload*** Theoretical courses — 52 Practical Lab exercises — 18 Group lab reports and presentations — 84 Independent study — 46 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit)** — **200**
STUDENT ASSESSMENT	1. Written final examination (70%) including ∞ Questions of brief development ∞ Judgment questions ∞ Problems solving 2. Laboratory exercises (30%) including ∞ Examination on laboratory practices ∞ Presentation of group work for each laboratory exercise (processing of experimental data – evaluation of final results) ∞ Written exam

5. RECOMMENDED LITERATURE

Suggested Books:

1. George Ktistis, Lessons of Physical Pharmacy, Publisher ZITI, 4th edition, 2007
2. Alexander T. Florence & David Attwood, Physicochemical Principles of Pharmacy, Pharmaceutical Press, 6th edition, 2015
3. Patrick J. Sinko, Martin's Physical Pharmacy and Pharmaceutical Sciences, Lippincott Williams & Wilkins, 6th edition, 2011

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

COURSE DESCRIPTION: **ENGLISH LANGUAGE AND TERMINOLOGY IV**
COURSE CODE: **PHA-B25-NEW**

ENGLISH LANGUAGE AND TERMINOLOGY IV
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-B25-NEW**	**SEMESTER OF STUDIES**	**4th**
COURSE TITLE	ENGLISH LANGUAGE AND TERMINOLOGY IV		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	3	2

COURSE TYPE	General Background course
PREREQUISITE COURSES:	-
TEACHING AND ASSESSMENT LANGUAGE:	English
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBPAGE (URL)	http://www.pharmacy.upatras.gr/images/DS/PHA-B25-EN.pdf

2. LEARNING OUTCOMES

Learning outcomes
By the end of this course the student will have: a) Improved their English reading skills, making feasible the studying of various text types related to their discipline, including textbook extracts, popularized articles and scientific articles. b) Developed a number of language and cognitive skills (most of which are transferable) necessary for participating in the academic discourse community, c) Further developed their language skills using the technology available in addition to classroom training. In other words they are prepared for autonomous learning.
General Abilities
Skills acquisition refers to: • Cultivation of skills in the use of English medical terminology • Developing production skills and understanding of written and spoken language • Proper pronunciation and expression • Acquiring academic writing skills • Working in an international environment • Working in an interdisciplinary environment

3. COURSE CONTENT

Study and analysis of medical texts on topics including:

- Introduction to pharmacology
- Forms of Drugs And How They Act
  - categorization of drug forms
  - routes of drug administration
- The medication order
- Drug therapy
- Drug abuse
- Generic vs brand name drugs
- General pharmaceutical and chemical terms

4. TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD	Lectures. Exercises in all four language skills: reading, writing, listening and speaking.
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Use of powerpoint and other audiovisual materials. E-class
TEACHING ORGANIZATION	***Teaching Method*** ***Semester Workload*** Lectures and exercises in all four language skills: reading, writing, listening and speaking. 39 Un-supervised Study 11 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit) 50**
STUDENT ASSESSMENT	Written final exam in English including grammatical, writing and vocabulary exercises. Lexical exercises.

5. RECOMMENDED LITERATURE

Προτεινόμενη Βιβλιογραφία:
Αγγλοελληνικό Ελληνοαγγλικό Λεξικό των Ιατρικών Όρων, Γεωργίου Ι. Μιχαηλίδη, Ιατρικές Εκδόσεις Κωνσταντάρας, Έκδοση Πέμπτη, Μάιος 2005.

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

COURSE DESCRIPTION: **BIOINORGANIC CHEMISTRY – MOLECULAR SIMULATIONS**
COURSE CODE: **PHA-C11-NEW**

BIOINORGANIC CHEMISTRY – MOLECULAR SIMULATIONS
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-C11-NEW**	**SEMESTER OF STUDIES**	**5th**
COURSE TITLE	BIOINORGANIC CHEMISTRY – MOLECULAR SIMULATIONS		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	3	6
Laboratory practice	3	

COURSE TYPE	Scientific Field course
PREREQUISITE COURSES:	-
TEACHING AND ASSESSMENT LANGUAGE:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Not offered
COURSE WEBPAGE(URL)	http://www.pharmacy.upatras.gr/images/DS/PHA-C11-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes

The course aims to enhance the knowledge of the Pharmacy Students in the field of:

(a) Biological macromolecules, which are of vital significance in a number of biochemical pathways and interesting pharmaceutical targets, with emphasis in biomolecules with inorganic centers/cofactors. For this reason, the students need to have previously acquired basic knowledge in General & Inorganic Chemistry, and Biochemistry

(b) Bioactive compounds, known or potential drugs, with metal ions (i.e. cis-platinum)

(c) Structural bioinformatics, data mining, aminoacid sequence homology, database architecture and use etc.

(d) Modelling, molecular simulation and structure prediction and analysis

(e) Application of experimental tools and methods in the structure determination of biomolecules or the simulation of biomolecular complex, including protein target – drugs complexes and the design of new potentially bioactive molecules.

Additionally, through the laboratory training the students are expected to develop their skills in the use of structural bioinformatics tools towards the study of the structure-activity relationship of biologically interesting biomolecules.
Finally, the present course, aims to enhance and extend the knowledge of the undergraduate students beyond the aspects of the Inorganic Chemistry and Biochemistry providing advanced knowledge in the field of biological inorganic chemistry and specific topics in Biochemistry (structural biochemistry).

General Abilities

Data search and mining, data evaluation using modern tools and methods
Independent thinking and work
Collaborative work and joint research efforts
Work in a competitive environment
Work in an interdisciplinary scientific environment
Producing new research ideas
Promote free, creative and inductive thinking

3. **COURSE CONTENT**

Bioinorganic Chemistry [Topic 01]

(a) Coordination compounds: Basic Principles and theory
(b) Bioinorganic Chemistry: Inorganic centers in biological macromolecules
(c) Metalloproteins & Metalloenzymes of biological and pharmaceutical interest
- Zn (zinc) Metalloenzymes (proteases, anhydrases, aminopeptidases, ligases, etc.)
- Heme and Copper proteins
- Iron-sulfur proteins
- Transcription factors and DNA repair proteins

(d) Biomimetic Chemistry (artificial enzymes)
(e) Metal complexes in pharmacy

Molecular Simulations [Topic 02]

(a) Biomolecular simulations and Structural Bioinformatics – Understanding the structural basis of biological processes
(b) Data bases organization, classifications and exploitation
(c) Basics in protein architecture, DNA & RNA, structural classification of proteins
(d) Protein Architecture, structure modeling approaches, experimental methods in protein structure determination, molecular/docking simulations
(e) Protein structure quality assessment and structural analysis

Laboratory training (Dry Lab)

Exercise 1: Data bases, data searching & mining Δεδομένων (SwissProt, PubMed etc.). Searching literature data in Pubmed and structures in PDB
Exercise 2: Sequence mining and alignment – Use of Blast & ClustalW.
Exercise 3: Protein Architecture (CATH & SCOP), Prediction of 2ndary & tertiary structure (NPS@ & 3D-PSSM servers)
Exercise 4: Molecular Display and Analysis of protein structures - use of MOLMOL software
Exercise 5: NMR conformational analysis of proteins
Exercise 6: Alignment, comparison, analysis and quality assessment of protein structures - use of PROCHECK software, Ramachandran plots, etc.

Exercise 7: Modeling of protein structures (comparative modeling & Threading)
Exercise 8: Molecular Docking, screening of virtual libraries (theory and applications)

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	Interactive teaching within a classroom
Use of information and communication technologies	∞ Use of modern technologies, web-based applications and software in laboratory training and in the communication with students. ∞ Teaching process is supported by Information and Communication Technologies (ICTs).
Teaching organization	***Teaching Method*** ***Semester Workload*** Lectures 39 Laboratory training 39 Un-supervised study 72 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit) 150**
STUDENT ASSESSMENT	Evaluation of the students is carried out through written examination at the end of the semester and oral evaluation during the laboratory courses. Written examination and oral evaluation is carried out in Greek language. Written examination includes the description for a number of theory topics and multiple-choice exercises.

5. RECOMMENDED LITERATURE

Suggested Books: (in greek)

1) Introduction in Protein Structure, Carl Branden & John Tooze (Eds), Garland Science, NY, USA, Taylor & Francis Group, 2006

2) Bioinorganic Chemistry, D.P. Kesisoglou & G Psomas, 2010, Thessaloniki

3) Laboratory Training Topics “Molecular Simulations”, G.A.Spyroulias, 2008, Patras

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

COURSE DESCRIPTION: **PHARMACEUTICAL BIOTECHNOLOGY**
COURSE CODE: **PHA-C12-NEW**

PHARMACEUTICAL BIOTECHNOLOGY
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-C12-NEW**	**SEMESTER OF STUDIES**	**5th**
COURSE TITLE	PHARMACEUTICAL BIOTECHNOLOGY		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	4	6
Laboratory practice	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-C12-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes
• To understand basic concepts. • To understand basic and advanced technical tools and methodologies in applied Molecular and Pharmaceutical Biotechnology. • To acquire basic skills in the laboratory. • To learn the most important applications, i.e. new biotechnology products and services such as in molecular diagnosis. • Emphasis is placed mainly and extensively on approved biological drugs. • New technologies are exploited in teaching. • High e-class visitation daily throughout the semester.
General Abilities
• Searching, retrieval, analysis, and synthesis of data and information by use of mainstream technologies and laboratory-experimental tools.

- Critical thinking.
- Conceptual thinking and novel ideas.
- Develop out of the box, creative and inductive thinking.
- Independent work.
- Team work.
- Interdisciplinary work.
- Work design and management.
- Decision making.
- Social, professional, ethical responsibility and sensitivity.

3. **COURSE CONTENT**

Lectures
Introduction into Molecular Biotechnology-Historical discoveries.
Basic and advanced tools of recombinant DNA technology: PCR and applications, methodologies for quantification of gene expression, cDNA and genomic libraries, DNA sequencing technologies, gene cloning, gene transfer in bacteria and eukaryotic cells, site-directed mutagenesis, production of recombinant proteins, protein engineering, transponsons, genetic engineering of plants, transgenic technologies, gene targeting, gene silencing, RNAi, gene editing.
"Omics" technologies. Genome sequencing and annotation. Genetic footprinting and applications.
Microbial synthesis of organic molecules (biotransformations-bioconversions).
Antisense technologies. Oligonucleotide drugs.
Biophysical and biochemical analysis of recombinant proteins.
Production, scale up, processing of biotechnology products. Immunogenicity of pharmaceutical proteins.
Pharmaceutical proteins: [1] insulins, [2] growth hormones, [3] haematopoietic factors, [4] interferons and interleukins, [5] coagulants and thrombolytic factors.
Production and engineering of monoclonal antibodies (humanized, chimeric, hybrid, human).
Catalytic antibodies (abzymes). Immunotoxins.
Monoclonal antibodies as drugs (anticancer, anti-inflammatory).
Vaccines produced by recombinant DNA technology. Biosimilars.
Cell therapies (iPCs, new technologies).
Regulatory issues and approval of biotech products.
Bioethics. Intellectual property.

Laboratory-Experiments
1. Introduction into recombinant DNA technology (VCR)
2. Isolation and quantification of genomic DNA. Analysis of VNTR polymorphisms in mtDNA.
3. Genetic Engineering I: bacterial cultures, preparation of competent bacterial cells, transformation, determination of yield of transformation. [Hands On]
4. Genetic Engineering II: Isolation, purification and quantification of plasmid DNA. Digestion with restriction enzymes, agarose electrophoresis, determination of restriction fragment sizes. [Hands On]
5. Genetic Engineering III: Site-directed mutagenesis-Single amino acid substitution in a protein by two-step PCR reaction. [Hands On]
6. Genetic Engineering IV: Electrophoresis, isolation/purification and confirmation of PCR products obtained in GE II, restriction digest, ligation for production of a recombinant DNA molecule (expression construct). [Hands On]

7. Bioinformatics (*in silico*):
   - ✓ Biotechnology databases (NCBI: OMIM, PubChem BioAssay/Compound/ Substance, Genbank/ EMBL, PDB)
   - ✓ Pharmaceutical databases (PharmLinks, FDA, EMA, κλπ).
   - ✓ BLAST searches, retrieval of nucleotide and protein sequences, and analysis (restriction maps, translation, secretion signal, functional motifs, multiple sequence alignment, phylogenetic tree, hydrophobicity/hydrophilicity and antigenicity plots, prediction of posttranslational modification sites, promoter sequences and transcription factor consensus sequences).
8. Production of monoclonal antibodies by hybridoma technology (VCR).
9. Development and production of 1st, 2nd and 3rd generation pharmaceutical proteins by bioengineering (VCR).

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	Interactive teaching within a classroom
Use of information and communication technologies	1. E-class 2. Biotechnology databases. 3. Software for data retrieval and analysis. 4. Educational videos, e.g. http://www.pharmacy.upatras.gr/index.php/el/research/labs/357--a-
Teaching organization	***Teaching Method*** — ***Semester Workload*** Lectures — 52 Laboratory training — 39 Preparation/Reports for Lab. training — 39 Supervised study — 20 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit) — 150**
STUDENT ASSESSMENT	I. Final Examination-Written (70% or 60% for those involved in seminar presentations) Escalating difficulty, descriptive and critical questions and problems, as well as multiple choice. Knowledge, critical thinking and problem solving capacity is tested. Representative template tests are presented and discussed during lectures and are to be found on e-class II. Laboratory (30%) 1. Final Examination-Written 2. Written Test/Quiz at the end of each Laboratory Experiment or VCR presentation 3. Oral Questions during Laboratory training 4. Written Report-Presentation and analysis of anticipated and obtained experimental results, Description of conclusions III. Group and individual oral presentations on specific topics-Supervised study (10%, voluntary) Exam in Greek In English for ERASMUS students

5. RECOMMENDED LITERATURE

Suggested Books:

1. 1st Greek Edition of "Pharmaceutical Biotechnology. Fundamentals and Applications" by Daan J.A. Crommelin, Robert D. Sindelar, Bernd Meibohm, 3rd Edition, Informa Healthcare (2008). Published by Parisianou Scientific Editions (2011).
2. 1st Greek Edition of "Recombinant DNA. Genes and Genomes-A Short Course" by James Watson, Amy Caudy, Richard Myers, Jan Witkowski, W. H. Freeman and Company, Cold Spring Harbour Laboratory Press, 3rd Edition (2007).
   Published by Basdra Academic Editions (2007)
3. Laboratory Excercises by G Sotiropoulou, I Zarkadis (2007)
   Available on E-class

Suggested Literature:

1. Handbook of Pharmaceutical Biotechnology. Edited by Shayne Cox Cad, Wiley-Interscience, A John Wiley & Sons, Inc., Publication, 2007
2. Crommelin DJ, Storm G, Verrijk R, de Leede L, Jiskoot W, Hennink WE. (2003) Shifting paradigms: biopharmaceuticals versus low molecular weight drugs. Int J Pharm 266: 3-16.
3. Mitragotri S, Burke PA, Langer R. (2014) Overcoming the challenges in administering biopharmaceuticals: formulation and delivery strategies. Nat Rev Drug Discov 13: 655-672.
4. Kimbrel EA, Lanza R. (2015) Current status of pluripotent stem cells: moving the first therapies to the clinic. Nat Rev Drug Discov 14: 681-692.

Suggested Scientific Journals

- Nature Biotechnology, Nature Reviews Drug Discovery, Nature, Science, Cell, PNAS USA
- BMC Systems Biology, Systems and Synthetic Biology.
- Pharmaceutical Journals.

Web Sources:

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

COURSE DESCRIPTION: **PHARMACOLOGY I**
COURSE CODE: **PHA-C13-NEW**

PHARMACOLOGY I
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-C13-NEW**	**SEMESTER OF STUDIES**	**5th**
COURSE TITLE	PHARMACOLOGY I		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	4	6
Laboratory work	2	

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-C13-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes
In general, this class ambitions to facilitate the acquisition of knowledge, skills and capabilities at the level 6 of the European Framework of Skills of Lifelong Learning. In particular, upon completion, it aims to provide students with the following: 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 though towards others and themselves Development of free, creative and inductive thinking

3. **COURSE CONTENT**

Lectures:
Introduction/General knowledge:

- Introduction to Pharmacology
- Basic Principles of Pharmacology
- Routes of drug administration
- Pharmacokinetics: Absorbance, distribution, metabolism and extraction of drugs
- Pharmacodynamics: Mechanisms of drug action, synergy, antagonism, dose-effect relationship, therapeutic index
- Parameters influencing the activity of drugs
- Drug-drug interactions
- Undesirable and side effects – Toxicity – Drug development

Special Chapters:

- Signaling and function of Autonomic NS receptors
- Adrenergic agonists
- Adrenergic antagonists
- Cholinergic agonists
- Cholinergic antagonists
- Opioid analgesics and opioid antagonists
- Introduction to CNS drugs
- Treatment of Alzheimer's disease
- Treatment of Parkinson's
- Drugs for the treatment of multiple sclerosis
- Drugs for the treatment of epilepsy and seizures
- Drugs for the treatment of anxiety and sleep disorder
- Drugs for the treatment of depression
- Neuroleptic-Antipsychotic drugs
- Drugs used as adjunct agents in surgery
- Gaseous and intravenous general therapeutics
- Topical anesthetics
- CNS excitatory molecules – Substances of abuse

Emphasis is given to:
Characteristics of each drug class, targeting of pathophysiological conditions, mechanism(s) of action at the cell/molecular level, major therapeutic indications, particular pharmacokinetic characteristics, frequent and/or dangerous side effects, major contraindications and high-risk drug-drug interactions

Laboratory training (via video and computer software-based simulations):

1. Comprehension/Consolidation of notions related to receptor theory (Agonists, Antagonists, drug dose-response curves, calculation of EC50, Potency and Effectiveness
2. Clinical picture and pharmacological treatment of Parkinson's and Alzheimer's diseases – Video demonstration of the action of opioid agonists and antagonists
3. Pharmacological approaches in the treatment of seizures, myasthenia and hyperthyroid toxicity

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
Teaching organization	***Teaching Method*** ***Semester Workload*** Lectures 52 Laboratory work 6 Unsupervised study 92 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit) 150**
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

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

COURSE DESCRIPTION: **SPECTROSCOPY**
COURSE CODE: **PHA-C14-NEW**

SPECTROSCOPY
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-C14-NEW**	**SEMESTER OF STUDIES**	**5th**
COURSE TITLE	SPECTROSCOPY		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	4	7
Laboratory practice	3	

COURSE TYPE	Scientific Field course
PREREQUISITE COURSES:	-
TEACHING AND ASSESSMENT LANGUAGE:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Not offered
COURSE WEBPAGE (URL)	http://www.pharmacy.upatras.gr/images/DS/PHA-C14-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes
Student familiarizes himself with the spectroscopic / spectrometric techniques (Raman, IR, UV / Vis, fluorescence spectrometry, MS, XRD) with emphasis on the analytical techniques that are mentioned in the Pharmacopoeia and used by pharmaceutical; companies for quality control of raw material, excipients and formulations. Specifically upon successful completion of the course the student is expected to have developed level 6 skills in the following subjects: Ability to choose and use the appropriate Spectroscopic / spectrometric technique for identification and quantification of liquid and/or solid samples with emphasis on pharmaceutical products and samples of biological origin.
General Abilities
1. Data analysis using the necessary technologies. 2. Independent work. 3. Group work.

3. COURSE CONTENT

1. Introduction to spectroscopic techniques for analysis
2. UV/Vis spectrometry
3. IR and Raman spectrometry
4. fluorescence spectrometry
5. Elemental Analysis techniques (Atomic Absorption and Emission spectrometry, ICP-MS, ICP-OES, XRF)
6. Thermal Methods: Thermogravimetric Analysis, Differential Thermal Analysis, Differential Scanning Calorimetry
7. Mass spectrometry: Ionization methods, explanation of mass spectra, connection to chromatography, detectors. Applications to pharmaceutical analysis
8. X-ray diffraction

Laboratory Exercises

- UV/Vis Spectrometry: Quantitative determination of active ingredients in pharmaceutical formulations: a) «acetylsalicylic acid» in «Aspirin®» tablets; b) «paracetamol» in «Depon®» tablets, c) «paracetamol» and «caffeine» in «Panadol Extra®» tablets, d) «caffeine» in «Caffeine Aguettant®» ampoules.
- Refractometry: a) Determination of sugar content in «Depon®» syrup, b) Determination of the refractive index of the active substance «Glucosamine Sulphate Sodium»
- Fluorimetry: Quantitative determination of the active ingredient «acetylsalicylic acid» in «Aspirin®» tablets
- Infrared spectrometry: Quantitative determination of the active ingredient «acetylsalicylic acid» in «Aspirin®» tablets
- (Proton) Nuclear Magnetic Resonance ^{1}H-NMR: ^{1}H-NMR spectrum acquisition for the active substance «paracetamol».

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	In a class	
Use of information and communication technologies	Learning using e-class platform, Software for data acquisition, software for data processing	
Teaching organization	***Teaching Method***	***Semester Workload***
	Lectures	52
	Practical Lab Exercises	26
	Experimental data processing (Department's computer room)	26
	Data Report	20
	Autonomous study	52
	Total number of hours for the Course **(25 hours of work-load per ECTS credit)**	**176**
STUDENT ASSESSMENT	I. Final written examination (50%) including: - Questions of brief development - Questions for judgement - Problem solving.	

	II. Laboratory exercises (50%) including. - Lab experiments - Group report on each experiment (data processing, discussion of results) - Written exam

5. RECOMMENDED LITERATURE

Suggested Books:

1. Instrumental Analysis, Th. P. Chatzioannou and M. Koupparis , Athens 2014 (in Greek)
2. Instrumental Chemical Analysis, I .Papadogiannis and B. Samanidou, 2nd Ed. Thessaloniki, 2011 (in Greek).
3. Pharmaceutical Analysis, D.G. WATSON, Parisianos, 2011 (Translated in Greek by M. Koupparis et. al).
4. Principles of Instrumental Analysis, D. A. Skoog, F. James Holler, S. R. Crouch, Kostarakis, 2016 (Translated in Greek by M. Karagiannis and K. Efstathiou).

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

COURSE DESCRIPTION: **CHEMISTRY OF NATURAL PRODUCTS**
COURSE CODE: **PHA-C15-NEW**

CHEMISTRY OF NATURAL PRODUCTS
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-C15-NEW**	**SEMESTER OF STUDIES**	**5th**
COURSE TITLE	CHEMISTRY OF NATURAL PRODUCTS		
INDEPENDENT TEACHING ACTIVITIES		**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures		4	5
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-C15-EN.pdf		

2. LEARNING OUTCOMES

Learning Outcomes
This course aims at acquiring knowledge, skills and competences related to Level 6 of the European Qualifications Framework for Lifelong Learning. Specifically, upon successful completion of the course, the students are expected to: 1. Have valid knowledge and comprehension of fundamental principles about Chemistry of Natural Products, supported by scientific textbooks and recent data acquired from research in this scientific field. 2. Understand the strategies of synthesis of natural products and to suggest new ones. 3. Possess a deep understanding of the science and can use it in a professional way.
General Abilities
• Data and information searching, analysis and combination, using the appropriate technologies and databases • Team work • Promotion of free, creative and inductive reasoning • Work in an interdisciplinary environment • Exercise of criticism and self-criticism • Respect to the natural environment

3. COURSE CONTENT

Lectures

- Introduction to chemistry of natural products
- Stereochemistry: definition, isomerism
- Chemistry and nomenclature of heterocyclic compounds
- Chemistry of amino acids (Properties, Stereochemistry, Methods of chemical synthesis)
- Chemistry of peptides (Introduction to peptide synthesis, Applications of synthetic peptides, Process of synthesizing peptides, *N*-terminal protecting groups, *C*-terminal protecting groups, Side chain protecting groups, Amino acid coupling, Peptide synthesis strategies)
- Chemistry of carbohydrates (Classification of Carbohydrates, Stereoisomers in Carbohydrates, Monosaccharides, Monosaccharide Derivatives, Reactions of Monosaccharides, Oligosaccharides, Polysaccharides)
- Chemistry of nucleic acids (Nomenclature, Structure analysis, Chemical synthesis of nucleic acids)
- Chemistry of terpenoids [The Isoprene Unit, Classification of Terpenes, Monoterpenes (acyclic monoterpenes, monocyclic monoterpenes, bicyclic monoterpenes), Sesquiterpenes, Diterpenes, Triterpens, Tetraterpenes]
- Chemistry of alkaloids (Classification, nomenclature, general properties, general methods for determining structure, stereochemistry, main categories: Phenylethylamine alkaloids, Pyrrolidine alkaloids, Pyridine & Piperidine alkaloids, Pyrrolidine and Pyridine alkaloids, Quinoline alkaloids, Isoquinoline alkaloids., Indole alkaloids, Phenanthrene alkaloids
- Chemistry of steroids (Steroid Nomenclature, Types, Stereochemistry of steroids, Chemical synthesis)

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	Face to Face
Use of information and communication technologies	∞ The teaching and learning process is supported by the Upatras e-class platform. The teaching material (lectures, tutorials) is uploaded and stored on the e-class and it is freely accessible to all students, and their assignments are controlled via the system. ∞ Teaching process is supported by Information and Communication Technologies (ICTs).
Teaching organization	***Teaching Method*** — ***Semester Workload*** Lectures — 52 Assignment and short projects — 15 Unsupervised study — 58 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit)** — **150**

STUDENT ASSESSMENT	Assessment language: Greek 1. Final Written Exams: questions of development, judgment and solving of problems, short answer questions, matching questions. 2. Assessment of a short project in the field of chemistry of natural products. Grade #2 counts for 10% of the final grade and the rest is calculated from grade #1

5. RECOMMENDED LITERATURE

Suggested Books

1. “Chemistry for Pharmacy Students”, S. D. SARKER, L. NAHAR, Edition: 1η/2015, ISBN: 9789605830328, Editor: Parissianos Publications
2. “Organic Chemistry”, JOHN McMURRY, Translation to Greek: A. Varvoglis, M. Orfanopoulos, I. Smonou et al, Edition: 4η/2012, ISBN: 9605240548, Editor: Crete University Press
3. "Chemistry of Natural Products", V. Ragoussis, Athens 1996, in greek
4. "Spectroscopy of Organic Compounds", D. Papaioannou, G. Stavropoulos, T. Tsegenidis, in Greek language only, University of Patras Publications Centre, Patras, 2005.
5. Notes of lecturers in Greek.

Suggested Scientific Journals

- Journal of Organic Chemistry
- Journal of Medicinal Chemistry
- Journal of Natural Products
- Bioorganic and Medicinal Chemistry
- Chemistry of Natural Compounds

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

COURSE DESCRIPTION: **SEPARATION METHODS - ELECTROANALYTICAL TECHNIQUES**
COURSE CODE: **PHA-C21-NEW**

SEPARATION METHODS - ELECTROANALYTICAL TECHNIQUES
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-C21-NEW**	**SEMESTER OF STUDIES**	**6th**
COURSE TITLE	SEPARATION METHODS - ELECTROANALYTICAL TECHNIQUES		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	4	6
Laboratory practice	3	

COURSE TYPE	Scientific Field course
PREREQUISITE COURSES:	-
TEACHING AND ASSESSMENT LANGUAGE:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Not offered
COURSE WEBPAGE (URL)	http://www.pharmacy.upatras.gr/images/DS/PHA-C21-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes
Student familiarizes himself with Electrochemical Instrumental Analysis Techniques and Separation Techniques with emphasis on the relevant analytical techniques used in Pharmacopoeia for the control of raw materials and excipients and formulations. Specifically upon successful completion of the course the student is expected to have developed level 6 skills in the following subjects: • Ability to choose the proper separation technique for separating solvent mixtures. Identification and quantification of the individual components of a liquid or solid sample using a variety of chromatographic techniques with emphasis on pharmaceutical formulations and samples of biological interest. ∞ Ability to choose and use between potentiometric and voltammetric electro-analytical techniques for the identification and quantification of ions as well as pharmaceutically active compounds in preparations and samples of biological interest.
General Abilities
1. Data analysis using the necessary technologies 2. Independent work 3. Group work

3. COURSE CONTENT

Lectures

Separation Techniques:

1. Extraction methods, countercurrent extraction
2. Liquid chromatography, theory of chromatography, mechanism of retention. Chromatography of partition, adsorption, ion exchange, affinity, exclusion, chiral. Instrumentation with emphasis to detectors. Applications on pharmaceutical analysis problems
3. Supercritical chromatography
4. Gas chromatography

Electrochemical and Bioelectrochemical methods of analysis:

1. Potentiometry: Ion selective and enzyme electrodes
2. Conductivity techniques
3. Amperometric techniques
4. Voltammetry with emphasis on Polarographic techniques and cyclic voltammetry

Laboratory Exercises

- Potensiometry: Quantitative determination of the active pharmaceutical ingredient «acetylsalicylic acid» in «Aspirin®» tablets.
- Potensiometry: Quantitative determination of the admixture (Cl-) in active pharmaceutical ingredient «Chlorothiazide».
- Voltammetry: Quantitative determination of the active pharmaceutical ingredient «Diazepam» with Differential Pulse Polarimetry.
- Ion Exchange: Determination of the NaCl concentration in saline.
- High Performance Liquid Chromatography: Separation and quantitative determination of the active ingredients of «Panadol Extra®» tablet.

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	In class and laboratory on hands training	
Use of information and communication technologies	Learning using e-class platform, Software for data acquisition, software for data processing	
Teaching organization	***Teaching Method***	***Semester Workload***
	Lectures	52
	Practical Lab Exercises	14
	Group class for data processing and lab reports	20
	Autonomous study	64
	Total number of hours for the Course **(25 hours of work-load per ECTS credit)**	**150**

STUDENT ASSESSMENT	I. Final written examination (50%) including: - Questions of brief development - Questions for judgement - Problem solving. II. Laboratory exercises (50%) including. - Lab experiments - Group report on each experiment (data processing, discussion of results) - Written exam

5. RECOMMENDED LITERATURE

Suggested Books:

1. Instrumental Analysis, Th. P. Chatzioannou and M. Koupparis , Athens 2014 (in Greek)
2. Instrumental Chemical Analysis, I .Papadogiannis and B. Samanidou, 2nd Ed. Thessaloniki, 2011 (in Greek).
3. Pharmaceutical Analysis, D.G. WATSON, Parisianos, 2011 (Translated in Greek by M. Koupparis et. al).
4. Principles of Instrumental Analysis, D. A. Skoog, F. James Holler, S. R. Crouch, Kostarakis, 2016 (Translated in Greek by M. Karagiannis and K. Eustathiou)

UNIVERSITY OF PATRAS
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UNDERGRADUATE STUDIES' COURSES

COURSE DESCRIPTION: **PHARMACEUTICAL TECHNOLOGY I**
COURSE CODE: **PHA-C22-NEW**

PHARMACEUTICAL TECHNOLOGY I
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-C22-NEW**	**SEMESTER OF STUDIES**	**6th**
COURSE TITLE	PHARMACEUTICAL TECHNOLOGY I		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	5	6
Tutorials	1	
Lac Courses	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-C22-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes
Students will: • Have the theoretical knowledge to design a potential safe, stable and bioavailable dosage form for a specific drug (select route of administration, dosage form type, excipients, manufacture method) • Be capable of reading and executing medical prescriptions (dispensing) in a pharmacy environment • Be capable to design and carry out basic pharmaceutical processing, such as particle size reduction (solids), particle size separation (solids), particle size analysis, mixing, drying, filtration, sterilization in pharmaceutical industry • Acquire expertise in powder technology • Be capable of performing preformulation studies
General Abilities
• Self-study • Group work • Work in interdisciplinary environment

- Adapt to new situations
- Search, analysis and synthesis of information using the necessary relevant technologies
- Design and execute projects

3. COURSE CONTENT

Theoretical courses

- Pharmaceutical Dispensing and compounding
- Physical and chemical incompatibilities in medicines dispensing and administration
- Pharmaceutical Processing: particle size reduction (solids), particle size separation (solids), particle size analysis, mixing, drying, filtration, sterilization, design of clean rooms
- Strategic Design of Drug Formulations- Preformulation Studies
- Biopharmaceutical considerations of Pre-formulation/ Formulation Design
- Excipients (Categories, Roles, Characteristics)
- Pharmaceutical packaging

Laboratory (practical) courses

Practical 1: Galenic preparations: Solutions

Practical 2: Galenic preparations: Mixing topical pharmaceuticals

Practical 3: Galenic preparations: Suspensions

Practical 4: Galenic preparations: Pediatric suspension

Practical 5: Galenic preparations: Preparation and quality control of hard gelatin capsules

Practical 6: Pharmaceutical Processing I: Particle size reduction of solids (Milling), Effect of milling time on the particle size and particle size distribution of a powder

Practical 7: Pharmaceutical Processing II: Mixing of solids, Determination of optimum mixing time for powders

Practical 8: Preformulation: Improvement of dissolution rate of a drug with low aqueous solubility through its dispersion in hydrophilic carrier

Practical 9: Mechanical strength of pharmaceutical tablets: Investigation of the relationship between the mechanical strength of the tablets and their density

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	Face-to-Face, Essays, Practical courses, Exercises Self-study	
Use of information and communication technologies	Eclass platform	
Teaching organization	***Teaching Method***	***Semester Workload***
	Lectures	65
	Practical Exercises	39
	Directed exercises	13
	Individual study	33
	Total number of hours for the Course **(25 hours of work-load per ECTS credit)**	**150**

STUDENT ASSESSMENT	Written exams; MCQ; Essays and exercises Language: Greek Final Grade: performance in written exam on the theoretical courses (80%), performance in practical (laboratory) courses: 20%.

5. RECOMMENDED LITERATURE

Suggested Books:

1. Aulton, M. E., (Ed.). Pharmaceutics: The Science of Dosage Form Design. Churchill Livingstone, U.K., 1988.
2. Lachman, L et al., (Eds.). The Theory and Practice of Industrial Pharmacy. Lea and Febiger, Philadelphia, 1986.
3. Remington: The Science and Practice of Pharmacy, 19th edition, 1995, Mack Publishing Company, Easton Pennsylvania.
4. Lembeck, F. Συνταγολογία (μετάφραση Ι. Σ. Παπαδόπουλου και Θ. Λουκά), 5η έκδοση, 1975, Εκδόσεις Παρισιάνος, Αθήνα.
5. Stoklosa, M. J. and Ansel, H. C. Pharmaceutical Calculations, 7th edition, 1980, Lea and Febiger, Philadelphia.
6. Aulton's Pharmaceutics. The Design and Manufacturing of Medicines. Edited by M.E. Aulton, Churchill Livingstone Elsevier, Third Edition, reprinted 2010
7. Biopharmaceutics and Clinical Pharmacokinetics. Fourth Edition. By Milo Gibaldi. Lea and Febiger: Malvem, PA, 1991.

Suggested Journals:

Journal of Pharmaceutical Sciences

UNIVERSITY OF PATRAS
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DEPARTMENT OF PHARMACY
UNDERGRADUATE STUDIES' COURSES

COURSE DESCRIPTION: **PHARMACOGNOSY I**
COURSE CODE: **PHA-C23-NEW**

PHARMACOGNOSY I
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-C23-NEW**	**SEMESTER OF STUDIES**	**6th**
COURSE TITLE	PHARMACOGNOSY I		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	4	6
Laboratory courses	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-C23-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes
This course aims at acquiring knowledge, skills and competences related to Level 6 of the European Qualifications Framework for Lifelong Learning. Specifically, upon successful completion of the course, the students are expected to: 1. have valid knowledge and comprehension of fundamental principles about Pharmacognosy and Phytotherapy, supported by scientific textbooks and recent data acquired from research in this scientific field. 2. know the regulatory framework of market authorization of herbal medicinal products by the European Medicines Agency 3. have acquired laboratory skills concerning the basic techniques in the field, like distillation, extraction, isolation and separation techniques, and structure identification. 4. possess a deep understanding of the science and can use it in a professional way. 5. can inform and consult experts and the general public patients about the herbal medicinal products
General Abilities
• Data and information searching, analysis and combination, using the appropriate technologies and databases

- Team work
- Promotion of free, creative and inductive reasoning
- Work in an interdisciplinary environment
- Exercise of criticism and self-criticism
- Respect to the natural environment

3. COURSE CONTENT

Lectures
Introductory concepts-Herbal drug terminology-Strategies of studying aromatic and medicinal plants (ethnopharmacology, random screening, chemical ecology). Strategies of pharmacognostic research. The contribution of pharmacognosy to drug discovery.
Herbal medicinal products. Regulatory framework of European Medicines Agency. Food supplements: an overview
Secondary metabolism. Basic routes of biosynthesis and categorization of natural products.
Carbohydrates (monosaccharides, antibiotics, disaccharides, gums and mucilage, products of sugar reduction, glycosides)-Relevant herbal drugs
Structure, origina and medicinal uses of carbohydrates: monosaccharides and their reduction products, disaccharides, herbal polysaccharides, glycosaminoglycans, gums and mucilages. Characteristic herbal drugs. Plant fibres. Bee products.
Natural Products originating biosynthetically from the shikimic acid pathway

- Tannins: Categorization, structure, isolation-identification. Herbal sources and medicinal uses
- Representative phenylpropanes and phenolic acids/esters: biosynthesis and analytical determination. Main herbal drugs.
- Essential oils: isolation and characterization methods. Biological properties
- Lignans and lignin: biosynthesis and categorization. Representative herbal drugs.
- Coumarins and furanocoumarins: biosynthesis, structure, properties, representative herbal drugs

Natural products originating biosynthetically from the acetic acid pathway. Main biosynthetic pathways.

- Aromatic polyketides
- Lipids and Waxes. Fatty Acids, Triacylglycerols, alkyne derivatives: structure, properties, identification. Plant Oils: nutritional value and medicinal uses.
- Anthraquinones & Flavonoids: biosynthesis, structure, categorization, identification methods, biological properties-medicinal uses, relevant herbal drugs. Kawa pyrones, Rotenone, Macrolides.
- Terpenoid products of the mevalonic acid pathway: monoterpenes, cannabinoids, sesquiterpenes, diterpenes: structure, biosynthesis, chemical and biological properties, medicinal uses, representative herbal drugs.

Laboratory-Experiments
Unit A: Liquid Chromatography Principles. Separation of aminoacids/bioactive components of analgesic drugs with TLC. Control of Esterification of the aminoacid carboxyl group
Unit B: Essential Oils. Isolation of eugenol from the cloves with steam distillation and purification with liquid-liquid extraction and rotary evaporation of the final pure product.
Unit C: Carbohydrates. Isolation of pectin from lemon pericarps. Sugar identification
Unit D: Flavonoids. Isolation of hesperidine from orange fruit peels. Identification of hesperidine with UV and IR spectroscopy. Hesperidine hydrolysis.
Unit E: Carotenoid-Chlorophylls. Separation of spinach natural dyes with column chromatography. Fraction collection and identification with chromatographic and spectroscopic techniques.
Unit F: Presentation of scientific papers on pharmacognosy by groups of few students. Getting acquainted with existing sources of information, evaluation and organization of information

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	Face to face

Use of information and communication technologies	∞ The teaching and learning process is supported by the Upatras e-class platform. The teaching material (lectures, tutorials, laboratory experimental protocols) is uploaded and stored on the e-class and it is freely accessible to all students, and their assignments are controled via the system. ∞ Teaching process is supported by Information and Communication Technologies (ICTs).
Teaching organization	***Teaching Method*** — ***Semester Workload*** Lectures — 52 Laboratory work — 15 Assignment and oral presentation — 20 Unsupervised study — 63 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit) — 150**
STUDENT ASSESSMENT	Assessment language: Greek 1. Assessment of learning laboratory skills and methods of isolation and identification of natural products by oral and written tests during laboratory sessions and final written exams with questions of development, judgment and solving of problems 2. Assessment of the public oral presentation 3. Final Written Exams: Multiple choice questions, short answer questions and matching questions. Grades #1 and #2 count for 40% of the final grade and the rest is calculated from grade #3.

5. RECOMMENDED LITERATURE

Suggested Books:

1. SAMUELSSON GUNNAR. Medicinal Products of Natural Origin-A textbook of Pharmacognosy. Translated by: Paul Cordopatis, Evy Manessi-Zoupa, George Pairas. Crete University Press, ISBN 978-960-524-015-8
2. C. Souleles. Pharmacognosy. Pigasso Editions, 1990
3. S. Katsiotis, P. Hantzopoulou. Aromatic Medicinal Plants and Essential oils. Editor: Kyriakidi Bros ISBN: 9604671863
4. Jean Bruneton. Pharmacognosy, Phytochemistry, Medicinal Plants, Intercept, 1999, ISBN 9781898298632
5. Paul M. Dewick. Medicinal Natural Products: A Biosynthetic Approach, 3rd Edition, John Wiley & Sons, Ltd, 9780470741689
6. European Medicines Agency. Herbal Monographs, http://www.ema.europa.eu/ema/index.jsp?curl=pages/medicines/landing/herbal_search.jsp
7. Paul Cordopatis & Vassiliki Magafa. Natural Product Isolation and Identification Methodology (Laboratory Guide). Patras University Publications. Patras 2005.

Suggested Journals

- Plant Medica
- Plant Medica Letters
- Journal of Natural Products
- Journal of Ethnopharmacology
- Phytotherapy Research
- Journal of Agricultural and Food Chemistry
- Bioorganic and Medicinal Chemistry
- Medicinal and Aromatic Plants
- Journal of Pharmaceutical and Biomedical analysis
- Journal of Chromatography

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

COURSE DESCRIPTION: **PHARMACOLOGY II**
COURSE CODE: **PHA-C24-NEW**

PHARMACOLOGY II
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-C24-NEW**	**SEMESTER OF STUDIES**	**6th**
COURSE TITLE	PHARMACOLOGY II		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	4	5
Tutorials	1	

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-C24-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes

In general, this class ambitions to facilitate the acquisition of knowledge, skills and capabilities at the level 6 of the European Framework of Skills of Lifelong Learning. Upon completion, it aims to provide students with the following:

1. Acquire a demonstrable knowledge and understanding of the knowledge area of Pharmacology and of Drug Action in humans, supported by using 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 though towards others and themselves • Development of free, creative and inductive thinking

3. COURSE CONTENT

Lectures

- Anti-hypertensive - Diuretic drugs
- Drugs used in heart failure - Antiarrhythmic drugs - Antianginal drugs
- Medicines that affect the blood
- Antihyperlipidemic drugs
- Estrogens/Androgens
- Adrenal hormones / Corticosteroids
- Pituitary medications - Drugs for Thyroid
- Drugs in the treatment of diabetes
- Gastrointestinal medications
- Drugs of the respiratory system Antimicrobial therapy principles - Folic acid antagonists - Cell wall synthesis inhibitors - Protein synthesis inhibitors - Quinolones, urinary antiseptic agents
- Antimycobacterial
- Anti-fungal drugs
- Antiprotozoal drugs - Drugs against helminths
- Antiviral drugs
- Autacoids and their antagonists
- Medicines for migraines
- Non steroidal anti-inflammatory drugs - Slow-acting immunomodulatory agents for arthritis - Gout remedies
- Drugs for obesity
- Medications for erectile dysfunction
- Medicines for osteoporosis

Emphasis is given to:
Characteristics of each drug class, targeting of pathophysiological conditions, mechanism(s) of action at the cell/molecular level, major therapeutic indications, pharmacokinetic characteristics, frequent and/or dangerous side effects, major contraindications and high-risk drug-drug interactions

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 tasksUse of E-class platform to communicate with students and manage their tasks Use of PCs in teaching

Teaching organization	***Teaching Method***	***Semester Workload***
	Lectures	52
	Tutorials	13
	Unsupervised study	60
	Total number of hours for the Course **(25 hours of work-load per ECTS credit)**	**125**
STUDENT ASSESSMENT	Evaluation done in greek • 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

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

COURSE DESCRIPTION: **MEDICINAL CHEMISTRY I**
COURSE CODE: **PHA-C25-NEW**

MEDICINAL CHEMISTRY I
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-C25-NEW**	**SEMESTER OF STUDIES**	**6th**
COURSE TITLE	MEDICINAL CHEMISTRY I		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	5	7
Tutorias	1	
Laboratory practice	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-C25-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes
This course aims at acquiring knowledge, skills and competences related to Level 6 of the European Qualifications Framework for Lifelong Learning. In particular, the present course aims to introduce students to the field of Medicinal Chemistry, which is related with the discovery, development, identification and synthesis of new bioactive compounds, the study of their metabolism, the interpretation of their mode of action at the molecular level and the construction of structure-activity relationships. Upon successful completion of the course: 1. They will have valid knowledge and comprehension of fundamental principles about the discovery and development of new bioactive molecules, which can be used either as therapeutic agents or as chemical biology tools. 2. They will have comprehended how the structural features and physicochemical properties of the new compounds influence their pharmacodynamics and pharmacokinetics. 3. They will have valid knowledge and comprehension of the current approaches applied in the targeted design and discovery of new lead compounds based on the related molecular target information.

4. They will be able to combine and apply the acquired knowledge for solving problems related to molecular design of new candidate bioactive molecules against molecular targets (enzymes, receptors).
5. They will be also able to suggest structural modifications of the new compounds in the context of structure-activity relationship studies for optimizing their pharmacodynamics and pharmacokinetics.
6. They will have valid knowledge and comprehension of the discovery, design, synthesis, metabolism and molecular mode of action of already known therapeutic agents.
7. They will have valid knowledge and comprehension of recent medicinal chemistry research topics, published in relevant textbook and scientific journals.
8. They will have acquired abilities to understand and solve interdisciplinary problems that involve medicinal chemistry issues.
9. They will have developed study skills necessary for their further scientific training and professional development.

General Abilities

- Data and information searching, analysis and combination, using the necessary technologies
- Independent work
- Team-work
- Work in an international environment
- Work in an interdisciplinary environment
- Generation of new research ideas

3. **COURSE CONTENT**

Lectures-Tutorials

∞ Introduction to drug discovery and development
∞ Structural features of compounds and pharmacologic activity
∞ Physicochemical and biopharmaceutical properties of drugs
∞ Enzymes, receptors, nucleic acids and miscellaneous molecular targets: Design of new bioactive compounds. Case studies in drug discovery
∞ Pharmacokinetics and drug metabolism.
∞ Strategies applied in the discovery of new lead compounds (serendipity in drug discovery, chemical modification, screening of compounds, rational drug design)
∞ Structural modifications strategies to optimize pharmacodynamics and pharmacokinetics
∞ Design of prodrugs
∞ Introduction to quantitative structure-activity relationships (QSAR)
∞ Diuretic drugs
∞ Antiarrhythmic drugs
∞ Antihypertensive drugs
∞ Nitrites and nitrates
∞ Hypolipidemic agents
∞ Anticoagulant drugs
∞ Antacids
∞ Gastric acid secretion inhibitors

∞ Cathartic drugs ∞ Antiemetic drugs Laboratory course ∞ Synthesis of acetylosalicylic acid ∞ Synthesis of benzocaine ∞ Synthesis of a sulfanilamide derivative ∞ Synthesis of propranolol ∞ Synthesis of a phenothiazine derivative ∞ Synthesis, lipophilicity determination, and QSAR study of chalcone derivatives

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	Face to face.
Use of information and communication technologies	∞ Teaching and learning processes are supported by the Upatras e-class platform. The teaching material (lectures, tutorials, laboratory experimental protocols) is uploaded and stored on the e-class and it is freely accessible to all students. ∞ Teaching process is supported by Information and Communication Technologies (ICTs).
Teaching organization	***Teaching Method*** — ***Semester Workload*** Lectures — 65 Tutorials — 13 Laboratory work — 18 Unsupervised study — 79 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit)** — **175**
STUDENT ASSESSMENT	Assessment language: Greek Lectures-Tutorials • Written exams: Multiple choice questions, short answer questions, matching questions and problem solving (70% of the final grade). Laboratory Course • Oral and written tests during the laboratory sessions, individual and teamwork laboratory projects and final written exams (multiple choice questions, problem solving) (30% of the final grade).

5. RECOMMENDED LITERATURE

Suggested Books:

1. Graham L. Patrick, "*An Introduction to Medicinal Chemistry*", 5th Edition, Oxford University Press, 2013.
2. Thomas L. Lemke, David A. Williams, "*Foye's Principles of Medicinal Chemistry*", 7th Edition, Lippincott Williams and Wilkins, 2012.
3. Richard B. Silverman, "*The Organic Chemistry of Drug Design and Drug Action*", 3rd Edition Academic Press, 2014.
4. Gareth Thomas, "*Medicinal Chemistry: An Introduction*", 2nd Edition, Wiley, 2008.

Scientific Journals:
Journal of Medicinal Chemistry
ACS Medicinal Chemistry Letters
European Journal of Medicinal Chemistry
ChemBioChem, ChemMedChem
Bioorganic and Medicinal Chemistry
Bioorganic and Medicinal Chemistry Letters
Angewandte Chemie International Edition
Medicinal Research Reviews

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

COURSE DESCRIPTION: **CLINICAL PHARMACY**
COURSE CODE: **PHA-D11-NEW**

CLINICAL PHARMACY
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-D11-NEW**	**SEMESTER OF STUDIES**	**7th**
COURSE TITLE	CLINICAL PHARMACY		
INDEPENDENT TEACHING ACTIVITIES		**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures		3	6
COURSE TYPE	Scientific Field course		
PREREQUISITE COURSES:	-		
TEACHING AND ASSESSMENT LANGUAGE:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Not offered		
COURSE WEBPAGE (URL)	http://www.pharmacy.upatras.gr/images/DS/PHA-D11-EN.pdf		

2. LEARNING OUTCOMES

Learning Outcomes

The Learning Outcomes of this course corresponding to Level 7, comprise the following:

- Highly specialized knowledge, some of it cutting-edge in the field of Clinical Pharmacy, 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

Specifically, following this course:

- Students will learn and understand the field of Clinical Pharmacy, namely the connection of the clinical picture and the laboratory results of the patients, with the appropriate pharmacotherapy, from the stage of research and development of the drugs to the stage of normal clinical use. This knowledge is also transferred by clinical and laboratory physicians at the University Hospital of Patras (Rio) who are aware of and keep abreast of modern developments at the cutting edge of their field of knowledge.
- At the end of the course, students are able to use the knowledge and understanding they have gained so that they can in the future (in their professional rehabilitation) approach the Clinic Pharmacist's role (profession) much better.

- Students are also able to recognize the great importance of the collaboration of pharmacists, clinicians, laboratory and nursing staff with the aim of optimally treating each patient.
- Students understand pathology, explain symptoms, combine information and eventually suggest treatment.
- Finally, students acquire sufficient knowledge to enable them to undertake postgraduate studies in related fields such as Clinical Pharmacy, Pharmacology, Toxicology.

General Abilities

- Searching, analysis and synthesis of facts and information, as well as using the necessary technologies
- Decision making
- Working in a multidisciplinary environment

3. COURSE CONTENT

- Endocrine Disorders (Thyroid-Diabetes)
- Cardiovascular Diseases (Hypertension, Congestive Heart Failure,
- Myocardial infarction)
- Rheumatic diseases
- Neurological diseases
- Gene Therapy in the Central Nervous System
- Treatment of chronic pain
- Gastrointestinal and liver diseases
- Renal diseases
- Infectious diseases
- Oncology
- Hematology
- Reproduction, reproductive disorders, contraception
- Specific age groups
- Medical Imaging
- Applications of Biotechnology in Clinical Practice
- Pharmacogenomic and Pharmacotherapy
- Laboratory analysis and clinical practice
- Eye diseases
- Anaphylaxis and Allergies
- Dermatological problems
- Substances abuse
- Drug Interactions
- Drug research and development
- Good Clinical Laboratory Practice
- Clinical drug research

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	Lectures, work face to face
Use of information and communication technologies	Through a web site of the Department of Pharmacy and e-class platform

Teaching organization	***Teaching Method***	***Semester Workload***
	Lectures and seminars by clinical and laboratory physicians at the University Hospital of Patras (Rio)	39
	Autonomous study	111
	Total number of hours for the Course **(25 hours of work-load per ECTS credit)**	**150**
STUDENT ASSESSMENT	Written examination at the end of the courses including topic development and answers to multiple choice questions.	

5. RECOMMENDED LITERATURE

Suggested Books:

1. Βιβλίο [12831664]: Lecture Notes Κλινική Φαρμακολογία και Θεραπευτική, GERARD A. MCKAY, JOHN L. REID, MATTHEW R. WALTERS [Λεπτομέρειες]
2. Βιβλίο [41691]: Φαρμακοθεραπεία. Κλινική φαρμακολογία, G. FULGRAFF, D. PALM [Λεπτομέρειες]

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

COURSE DESCRIPTION: **PHARMACEUTICAL TECNOLOGY II**
COURSE CODE: **PHA-D12-NEW**

PHARMACEUTICAL TECNOLOGY II
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-D12-NEW**	**SEMESTER OF STUDIES**	**7th**
COURSE TITLE	PHARMACEUTICAL TECNOLOGY II		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	5	9
Tutorials	2	
Laboratory course	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-D12-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes
Student will be able to: ∞ Design dosage forms and formulate drugs according to the route of administration selected ∞ Select appropriate excipients for specific dosage forms, according to the legislation and regulations applying in the specific area where the product will be used ∞ Formulate stable and safe dosage forms at small scale ∞ Know the importance of each step of the manufacturing procedure, for the production of safe and stable formulations with high bioavailability ∞ Give pharmaceutical care information to patients in respect to the dosage form preparation (if applying), storage, and administration ∞ Test the quality of dosage forms/pharmaceutical products, according to the current regulations/ legislation
General Abilities
• Self-study • Work in inter σε interdisciplinary environment

- Adapt to new situations
- Search, analysis and synthesis of information
- Design and execute projects

3. COURSE CONTENT

Pharmaceutical Dosage Forms:
Scope
Advantages, Disadvantages
Ingredients
Formulation
Manufacture
Drug Release
Quality Control
Stability
Packaging and Storage

Liquid and Semi-Solid Dosage Forms:
Pharmaceutical Solutions (Syrups, Elixirs, Spirits, Tinctures, Liniments etc)
Suspensions
Colloidal Dispersions
Emulsions
Gels
Magmas
Lotions
Pastes

Solid Dosage Forms (suppositories, capsules, tablets, etc)

Aerosols

Special Controlled Release/Nanotechnology Dosage Forms

Stability of formulations

Quality Design and Quality Control

Practical Courses on formulation of

1. Solutions, Syrops, Suspensions, Tinctures, Colloidal Dispersions,
2. Emulsions, Ointments, Creams, Pasts, Gels
3. Suppositories
4. Divided Powders, Effervescent granules (dry-granulation), Hard-gelatin Capsules
5. Tablets, Wet granulation
6. Quality Control of a batch of tables (Pharmacopoeia regulations)

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	Face-to-Face, Essays, Practical courses, Exercises, Self-study	
Use of information and communication technologies	E-class platform	
Teaching organization	***Teaching Method***	***Semester Workload***
	Lectures	65
	Laboratory Exercises/ Practical course	52
	Directed Exercises	26
	Self-study	82
	Total number of hours for the Course **(25 hours of work-load per ECTS credit)**	**225**

STUDENT ASSESSMENT	Written exams; MCQ; Essays and exercises Final Grade • Written Exam (70-80%) • Bibliographic exercise [volunteer] (10%) • Practical Laboratory course (20%) The practical course grade is based on short tests and questions during practicals, grade of Lab book and final written exam on the laboratory experiments

5. RECOMMENDED LITERATURE

Proposed Literature for self-study:

1. Aulton's Pharmaceutics. The Design and Manufacturing of Medicines. Edited by M.E. Aulton, Churchill Livingstone Elsevier, Third Edition, reprinted 2010
2. Biopharmaceutics and Clinical Pharmacokinetics. Fourth Edition. By Milo Gibaldi. Lea and Febiger: Malvem, PA, 1991.
3. FASTtrack PHARMACEUTICS-DRUG DELIVERY AND TARGETING, Yvonne Perrie, Thomas Rades, Pharmaceutical Press, 2010
4. Lachman, L et al., (Eds.). The Theory and Practice of Industrial Pharmacy. Lea and Febiger, Philadelphia, 1986.

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

COURSE DESCRIPTION: **PHARMACOGNOSY II**
COURSE CODE: **PHA-D13-NEW**

PHARMACOGNOSY II
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-D13-NEW**	**SEMESTER OF STUDIES**	**7th**
COURSE TITLE	PHARMACOGNOSY II		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	4	8
Laboratory practice	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-D13-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes
This course aims at acquiring knowledge, skills and competences related to Level 6 of the European Qualifications Framework for Lifelong Learning. Specifically, upon successful completion of the course, the students are expected to: 1. have valid knowledge and comprehension of fundamental principles about Pharmacognosy and Phytotherapy, supported by scientific textbooks and recent data acquired from research in this scientific field. 2. know the regulatory framework of market authorization of herbal medicinal products by the European Medicines Agency 3. have acquired laboratory skills concerning the basic techniques in the field, like distillation, extraction, isolation and separation techniques, and structure identification. 4. possess a deep understanding of the science and can use it in a professional way.
General Abilities
• Searching, retrieval, analysis, and synthesis of data and information by use of mainstream technologies and laboratory-experimental tools.

- Data and information searching, analysis and combination, using the appropriate technologies and databases
- Team work
- Promotion of free, creative and inductive reasoning
- Work in an interdisciplinary environment
- Work in an international environment
- Exercise of criticism and self-criticism
- Respect to the natural environment

3. **COURSE CONTENT**

- Triterpenes, Saponins, Cardiac glycosides
- Tetraterpenes
- Aminoacids. Cardiotoxins, Neurotoxins-Snake Venoms
- Herbal drugs and natural products originating biosynthetically from amino acids -Alkaloids (Protalkaloids, alkaloids Erythropyroleum, Pyridine and piperidine, Tropane ones, Pyrrolizidine, Quinolizidine, Isoquinoline, Benzylisoquinoline, bis-bibenzylisoquinoline ones, indole, ergot, rauwolfia, Strychnos, Catharanthus, Quinoline, Cinchona, Imidazole, Verartum, Solanum, Aconitum).
- Purines (Coffea beans, Tea leaves, Mate, Cola beans, Guarana, Cacao beans).

Laboratory courses

Unit A: Esters
1. Synthesis of acetic isopentylester
2. Synthesis of salicylic methylester

Unit B: Steroids
1. Isolation of cholesterol from gallstones
2a. Synthesis of 5α, 6β-dibromocholesterol
2b. Synthesis of cholesterol from 5α, 6β-dibromo-cholesterol

Unit C: Terpenes
1. Reduction of monoterpenes carrying an aldehyde group
2. Oxiadation of menthol to menthone

Unit D: Alkaloids
1. Isolation of nicotine from tobacco leaves
2. Isolation of piperine from black pepper
3. Piperine hydrolysis

Unit E: Peptides-Enzymes
1. Synthetic preparation of a dipeptide
2. Isolation of emulsion from almonds

Unit F: Purines
1. Isolation of caffeine from tea leaves
2. Isolation of caffeine from coffee beans

Unit G: Lipoids
1. Hydrolysis of trimyristin
2. Synthetic preparation of azelaic acid

Unit H: Natural Product Identification
1. Spectroscopic analysis
2. HPLC analysis of a herbal extract

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	Face to face
Use of information and communication technologies	∞ The teaching and learning process is supported by the Upatras e-class platform. The teaching material (lectures, tutorials, laboratory experimental protocols) is uploaded and stored on the e-class and it is freely accessible to all students, and their assignments are controled via the system.
	∞ Teaching process is supported by Information and Communication Technologies (ICTs).
Teaching organization	***Teaching Method*** — ***Semester Workload*** Lectures — 52 Laboratory work — 15 Assignment and oral presentation — 20 Unsupervised study — 113 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit) — 200**
STUDENT ASSESSMENT	Assessment language: Greek 1. Assessment of learning laboratory skills and methods of isolation and identification of natural products by oral and written tests during laboratory sessions and final written exams with questions of development, judgment and solving of problems 2. Assessment of the public oral presentation 3. Final Written Exams: Multiple choice questions, short answer questions and matching questions. Grades #1 and #2 count for 50% of the final grade and the rest is calculated from grade #3.

5. RECOMMENDED LITERATURE

Suggested Books:

1. SAMUELSSON GUNNAR. Medicinal Products of Natural Origin-A textbook of Pharmacognosy. Translated by: Paul Cordopatis, Evy Manessi-Zoupa, George Pairas. Crete University Press, ISBN 978-960-524-015-8
2. C. Souleles. Pharmacognosy. Pigasso Editions, 1990
3. S. Katsiotis, P. Hantzopoulou. Aromatic Medicinal Plants and Essential oils. Editor: Kyriakidi Bros ISBN: 9604671863
4. Jean Bruneton. Pharmacognosy, Phytochemistry, Medicinal Plants, Intercept, 1999, ISBN 9781898298632
5. Paul M. Dewick. Medicinal Natural Products: A Biosynthetic Approach, 3rd Edition, John Wiley & Sons, Ltd, 9780470741689
6. European Medicines Agency. Herbal Monographs, http://www.ema.europa.eu/ema/index.jsp?curl=pages/medicines/landing/herbal_search.jsp
7. Paul Cordopatis & Vassiliki Magafa. Natural Product Isolation and Identification Methodology (Laboratory Guide). Patras University Publications. Patras 2005.

Suggested Journals

- Plant Medica
- Plant Medica Letters
- Journal of Natural Products
- Journal of Ethnopharmacology
- Phytotherapy Research
- Journal of Agricultural and Food Chemistry
- Bioorganic and Medicinal Chemistry
- Medicinal and Aromatic Plants
- Journal of Pharmaceutical and Biomedical analysis
- Journal of Chromatography

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

COURSE DESCRIPTION: **MEDICINAL CHEMISTRY II**
COURSE CODE: **PHA-D14-NEW**

MEDICINAL CHEMISTRY I
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-D14-NEW**	**SEMESTER OF STUDIES**	**7th**
COURSE TITLE	MEDICINAL CHEMISTRY II		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	5	7
Tutorias	1	

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-D14-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes

This course aims at acquiring knowledge, skills and competences related to Level 6 of the European Qualifications Framework for Lifelong Learning. In particular, the present course aims to introduce students to the field of Medicinal Chemistry, which is related with the discovery, development, identification and synthesis of new bioactive compounds, the study of their metabolism, the interpretation of their mode of action at the molecular level and the construction of structure-activity relationships.

Upon successful completion of the course:

1. They will have valid knowledge and comprehension of fundamental principles about the discovery and development of new bioactive molecules, which can be used either as therapeutic agents or as chemical biology tools.
2. They will have comprehended how the structural features and physicochemical properties of the new compounds influence their pharmacodynamics and pharmacokinetics.
3. They will have valid knowledge and comprehension of the current approaches applied in the targeted design and discovery of new lead compounds based on the related molecular target information.

4. They will be able to combine and apply the acquired knowledge for solving problems related to molecular design of new candidate bioactive molecules against molecular targets (enzymes, receptors).
5. They will be also able to suggest structural modifications of the new compounds in the context of structure-activity relationship studies for optimizing their pharmacodynamics and pharmacokinetics.
6. They will have valid knowledge and comprehension of the discovery, design, synthesis, metabolism and molecular mode of action of already known therapeutic agents.
7. They will have valid knowledge and comprehension of recent medicinal chemistry research topics, published in relevant textbook and scientific journals.
8. They will have acquired abilities to understand and solve interdisciplinary problems that involve medicinal chemistry issues.
9. They will have developed study skills necessary for their further scientific training and professional development.

General Abilities

- Data and information searching, analysis and combination, using the necessary technologies
- Independent work
- Team-work
- Work in an international environment
- Work in an interdisciplinary environment
- Generation of new research ideas

3. COURSE CONTENT

Lectures-Tutorials

- Steroids
- Corticosteroids
- Contraceptives
- Anabolics
- Medicines for the Treatment of Diabetes
- Antithyroids
- Anxiolytics
- Analgesics - Antipyretics
- Antiepileptics
- Antidepressants
- Antiparkinsonian
- Non-Steroidal Anti-inflammatory Drugs
- Local & General Anaesthetics

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	Face to face.
Use of information and communication technologies	∞ Teaching and learning processes are supported by the Upatras e-class platform. The teaching material (lectures, tutorials, laboratory experimental protocols) is uploaded and stored on the e-class and it is freely accessible to all students. ∞ Teaching process is supported by Information and Communication Technologies (ICTs).

Teaching organization	***Teaching Method***	***Semester Workload***
	Lectures	65
	Tutorials	13
	Unsupervised study	97
	Total number of hours for the Course **(25 hours of work-load per ECTS credit)**	**175**
STUDENT ASSESSMENT	Assessment language: Greek Lectures-Tutorials • Written exams: Multiple choice questions, short answer questions, matching questions and thematic reports.	

5. RECOMMENDED LITERATURE

Suggested Books:

1. Graham L. Patrick, "*An Introduction to Medicinal Chemistry*", 5th Edition, Oxford University Press, 2013.
2. Thomas L. Lemke, David A. Williams, "*Foye's Principles of Medicinal Chemistry*", 7th Edition, Lippincott Williams and Wilkins, 2012.
3. Richard B. Silverman, "*The Organic Chemistry of Drug Design and Drug Action*", 3rd Edition Academic Press, 2014.

Scientific Journals:

Journal of Medicinal Chemistry
ACS Medicinal Chemistry Letters
European Journal of Medicinal Chemistry
ChemBioChem, ChemMedChem
Bioorganic and Medicinal Chemistry
Bioorganic and Medicinal Chemistry Letters
Angewandte Chemie International Edition
Medicinal Research Reviews

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

COURSE DESCRIPTION: **BIOPHARMACEUTICS - PHARMACOKINETICS**
COURSE CODE: **PHA-D21-NEW**

BIOPHARMACEUTICS - PHARMACOKINETICS
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-D21-NEW**	**SEMESTER OF STUDIES**	**8th**
COURSE TITLE	BIOPHARMACEUTICS - PHARMACOKINETICS		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	4	7
Laboratory exercises	4	
Tutorial	2	

COURSE TYPE	Scientific Field course
PREREQUISITE COURSES:	-
TEACHING AND ASSESSMENT LANGUAGE:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Not offered
COURSE WEBPAGE (URL)	http://www.pharmacy.upatras.gr/images/DS/PHA-D21-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes

The Learning Outcomes of this course corresponding to Level 7, comprise the following:

- Highly specialized knowledge, some of it cutting-edge in the fields of Biopharmaceutics and Pharmacokinetics, as a base for innovative thinking and research
- Critical understanding of the knowledge status in these fields and their 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 fields

Specifically, following this course:

- Students learn and understand the issues and importance of Biopharmaceutical-Pharmacokinetics and acquire the necessary knowledge to understand how we determine a dosing regimen for a patient for optimal treatment.
- In particular, by using all the knowledge that they have provided in Pharmacy and learning new concepts, they link the release, absorption, distribution, metabolism and elimination of drugs, with optimal pharmacotherapy (maximum efficacy with minimization of toxicity).

- At the end of the course, students are able to use the knowledge and understanding they have gained so that they can in the future (in their professional rehabilitation) better approach the role (profession) of the Clinical Pharmacokinetics / Clinical Pharmacologist / Clinic Toxicologist.
- Students are also able to recognize the great importance of pharmacists, clinicians, laboratory and nursing staff, with the aim of optimizing each patient and adapting the dosage regimen to each patient (personalized treatment).
- Students better understand pathology, explain symptoms, combine information and eventually suggest treatment.
- Finally, students acquire sufficient knowledge to enable them to undertake postgraduate studies in related fields such as Clinical Pharmacy, Pharmacology, Toxicology, etc.

General Abilities

Generally, by the end of this course the student will, furthermore, have develop the following general abilities:

- Searching, analysis and synthesis of facts and information, as well as using the necessary technologies
- Decision making
- Working in a multidisciplinary environment
- Group work

3. **COURSE CONTENT**

Lectures

- Introduction to bioavailability and biopharmaceuticals.
- Introduction to classical and clinical pharmacokinetics.
- Basic principles of pharmacokinetics and pharmacokinetic models.
- One- compartment open model, intravenous bolus administration. Elimination rate constant and its calculation from plasma and urine data. Significance of the Apparent volume of distribution. Drug Clearance.
- Multi-compartmental open model, intravenous bolus administration. Method of Residuals. Apparent volumes of distribution (central-peripheral compartment, Extrapolated, by area) and their significance. Elimination rate constant and drug clearance.
- Intravenous infusion. Steady-State Drug Concentration and Time needed to Reach. Initial dose. The clinical significance of drug clearance and Apparent volume of distribution during intravenous infusion.
- Physiological factors of distribution in the body. Diffusion and hydrostatic pressure.
- Drug distribution in the body. Drug uptake by tissues, blood flow, half-life, apparent volume of distribution.
- Protein binding of drugs. Determinants and kinetics of protein binding. Determination of binding constants and binding sites. Relationship of plasma drug-protein binding to distribution and elimination. Clinical significance of drug- protein binding.
- Drug absorption. Physiological factors associated with absorption. Routes of drug administration. Passage of drugs across cell Membranes.
- Drug absorption following oral administration. Anatomical and Physiological considerations of drug absorption from the gastrointestinal tract.
- Factors and pathological conditions (achlorydria, heart failure, inflammatory disease of intestine, drugs / foods that affect absorption) affect drug absorption.

- Zero and first order absorption models. Determination of absorption and elimination rate constants. Determination of maximum concentration and lag time.
- Other routes of drug administration : intranasal, inhalation, topical and transdermal administration.
- Multiple-dose regiments. Drug accumulation and the principle of superposition. Repetitive oral and intravenous administrations. Loading Dose. Intermittent intravenous infusion.
- Renal drug excretion. The Kidney: anatomy, blood supply, glomerular Filtration and urine formation. Renal clearance, clearance models, determination of Renal clearance. Mechanisms of renal drug excretion.
- Hepatic elimination of drugs. Anatomy and physiology of the liver. Hepatic enzymes and drug metabolism. Drug Biotransformation reactions. Enzymes Kinetics, enzyme inhibition-induction. Metabolites Pharmacokinetics and percentage of non-metabolised drug. Hepatic clearance affected by protein binding, alteration of hepatic enzyme activity, changing blood flow to the liver. First-pass effect. Biliary excretion of drugs.
- Adjustment of dosage regimen to kidney disease. Renal insufficiency and General pharmacokinetic considerations. Glomerular filtration rate: calculation Serum creatinine and creatinine clearance. Principles of dose adjustment to uremia. Methods of personalization of dosage form in kidney disease.Nomograms. Adjustment of dosage regimen during extracorporeal. Drug withdrawal: hemodialysis, peritoneal dialysis, amodifilcation.
- Dose adjustment in patients with liver disease.
- Genetic factors and pharmacokinetics. Introduction to pharmacogenomics- Pharmacogenetics. Genetic polymorphism in drug metabolism, in drug transport, in drug target. Pharmacokinetics and pharmacogenomics-pharmacogenetics.
- Non-linear pharmacokinetics. Introduction to dose-dependent pharmacokinetics.
- Drug elimination by capacity-limited pharmacokinetics.
- Saturable enzymatic elimination processes: dependence of clearance and Half-life on dose. Non-linear pharmacokinetics due to drug-protein binding.
- Chronopharmacokinetics and time-dependent pharmacokinetics.
- Applications of Pharmacokinetics in clinical situations: individualization of drug dosage regimen.
- Determination of initial dose and dosage
- Regiments. Therapeutic drug monitoring. Measurement of levels of the drug in plasma. Determination of dose. Conversion from intravenous infusion to oral dosing.
- Dosing of drugs in children, the elderly and obese patients.
- Pharmacokinetics of drug interactions. Effect of food on drug dispotition.
- Population pharmacokinetics. Regional pharmacokinetics.
- Bioequivalence and bioavailability. Relative and absolute bioavailability.
- Bioequivalence studies. The biopharmaceutics drug classification system.
- Generics and biosimilars drugs.
- Modified-release drug products and pharmacokinetics.
- Targeted drug delivery systems, biotechnology products. Bioavailability-pharmacokinetics.
- Process validation, drug product quality and impact on drug bioavailability.
- Relationship between Pharmacokinetics and pharmacodynamics. Relationship between dose and half-life on the pharmacologic effect and duration of activity.

Tutorial

- Summarize useful mathematical relations, classes of reactions,linear analysis, least squares method.
- Use of pharmacokinetics models and design compartmental models.
- Measurement the amount of drug in the body and tissues and concentration using compartmental pharmacokinetic models.
- Drug absorption after oral administration. Exercises to alter absorption due to food intake or other medications.
- Determination of half-life, elimination rate constant, volume of drug distribution and clearance of plasma and urine concentration data.

- Determination of intravenous infusion rate and loading dose.
- Modification of dosage regimen when protein synthesis and binding change.
- Personalized dosage regimen in patients with renal failure: based on renal clearance or elimination rate constant of the drug.
- Determination of dose and dosage interval during multiple-dose regimen.
- Dosing of drugs in infants, children and the elderly.
- Modification of dosage regimen when pharmacokinetics is converted to non-Linear.
- Pharmacokinetic- pharmacodynamic models with an effect compartment.
- Hysterisis of pharmacologic response.
- Multiple-dose regiments. Calculation of the new dosage regimen in case of missed dose or when one of the drug dose is taken earlier or later than scheduled.

Laboratory exercises

- Protein binding of drugs. Quantitative and qualitative determination of various active ingredients binding to proteins using chromatography.
- Kinetics simulation using compartmental models
- Bioavailability of drugs according to EMEA guidelines. Processing data from clinical bioavailability and bio-equivalence studies between generic and brand name drugs.

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	Lectures, laboratory exercises and tutorial work face to face.
Use of information and communication technologies	Through a web site of the Department of Pharmacy and e-class platform.
Teaching organization	***Teaching Method*** — ***Semester Workload*** Lectures — 52 Laboratory exercises — 26 Tutorial — 52 Autonomous study — 45 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit) — 175**
STUDENT ASSESSMENT	• Written examination at the end of the courses including topic development, answers to multiple choice questions and exercise solving. • Laboratory exercises, report with the results of the exercises and written examinations at the end of each exercise. • The final score is about 80% from the grade of the written examination and 20% from the grade of the laboratory

5. RECOMMENDED LITERATURE

Relevant Scientific Journals

According to "Eudoxus" and as mentioned at the end of Student Notes (Bibliography)

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

COURSE DESCRIPTION: **INTRODUCTION TO INTERNAL MEDICINE - EMERGENCY MEDICINE**
COURSE CODE: **PHA-D22-NEW**

INTRODUCTION TO INTERNAL MEDICINE-EMERGENCY MEDICINE
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-D22-NEW**	**SEMESTER OF STUDIES**	**8th**
COURSE TITLE	INTRODUCTION TO INTERNAL MEDICINE - EMERGENCY MEDICINE		
INDEPENDENT TEACHING ACTIVITIES		**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures		3	3
COURSE TYPE	Scientific Field course		
PREREQUISITE COURSES:	-		
TEACHING AND ASSESSMENT LANGUAGE:	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Not offered		
COURSE WEBPAGE (URL)	http://www.pharmacy.upatras.gr/images/DS/PHA-D22-EN.pdf		

2. LEARNING OUTCOMES

Learning Outcomes
The course is the main introductory lesson in the concepts of Internal Medicine and Emergency Medicine. The subject matter of the course aims at introducing the students to the basic concepts of Internal Medicine and Emergency Medicine topics. This includes the development by the teacher of the basic knowledge of anatomy and physiology of the organs and systems of the human organism. On the basis of their understanding, the pathophysiological mechanisms of the diseases are explained so as to distinguish between the concept of "physiological mechanism" and the "pathological disorder". The methodology of the course includes the classification of diseases and the approximation of each pathological condition at the level <definition-etiology-pathophysiology-clinical image-laboratory investigation-imagine approach-treatment-prognosis>. In addition to basic illnesses per system, the concepts of acute pathological disorder and emergency medical event are developed so that the student becomes familiar with their recognition and proposed treatment. Upon successful completion of the course the student will be able to: • understand the basic principles of anatomy and physiology of human organs and systems • understand the basic principles of pathophysiology of the human organism and the recognition of the basic pathological entities by system • recognize acute pathological syndromes and urgent pathological disorders • be familiar with the use of <normal> and <pathological> terms as well as their approach methodology

- assess the existence of the Pathological Entity and its correlation with the social organization and structure
- organize critical thinking about the social approach of specific Pathological Entities. It also forms a coherent thought and opinion on Social-Ethical-Disease issues
- cooperate with his/her fellow students in recognition, diagnostic approach and therapeutic intervention of an acute pathological event
- transfer the knowledge received to his/her professional and social environment, as well as to co-ordinate at the level of organizing courses and managing Emergencies with students from other Universities

General Abilities

- Basic knowledge of approach to disease
- Understanding of pathogenesis of acute medical problems
- Autonomous Work
- Teamwork
- Decision making
- Work in an international environment
- Working in an interdisciplinary environment
- Respect for diversity and multiculturalism
- Promote free, creative and inductive thinking

3. COURSE CONTENT

i. Basic concepts. Introduction to Anatomy and Physiology.

ii. Introduction to the Pathological and Urgent Medical Problems.

iii. Disease Approach Methodology. From the differential diagnosis to Therapeutic Intervention. Apply the terms <definition-diagnosis-clinical, laboratory, imaging-therapy> to the pathological entities. Analysis of particular pathological entities by systems - Central nervous system, respiratory system, heart and vessels, digestive disorders, oncological problems, hematological disorders, urogenital system, metabolic disorders, endocrinology problems.

iv. Social approach to the disease.

v. An Interactive Approach to the Urgent Clinical Problem.

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	Direct	
Use of information and communication technologies	Support Learning through the e-class platform	
Teaching organization	***Teaching Method***	***Semester Workload***
	Lectures	26
	Autonomous study	49
	Total number of hours for the Course **(25 hours of work-load per ECTS credit)**	**75**

STUDENT ASSESSMENT	Written final examination with ranking difficulty on the basis of the issues and subjects presented during theoretical courses. The exams will include: • Questions of theoretical knowledge. • Theoretical problems to be resolved. Interactive presence of the student during the amphitheater lectures The final degree is the sum of the above two individual evaluations.

5. RECOMMENDED LITERATURE

Recommended Literature:

1. Harrison's Principles of Internal Medicine, 19th Edition Textbook, ISBN-13: 978-0071802154, McGraw Hill
2. Παθολογία με μια ματιά, Davey Patrick, ISBN: 978-960-583-030-4, ΠΑΡΙΣΙΑΝΟΥ ΑΝΩΝΥΜΗ ΕΚΔΟΤΙΚΗ
3. Davidson’s γενικές αρχές και κλινική πράξη της ιατρικής παθολογίας, N. BOON, N. COLLEDGE, B. WALKER, J. HUNTER, ISBN: 9789605832131, ΠΑΡΙΣΙΑΝΟΥ ΑΝΩΝΥΜΗ ΕΚΔΟΤΙΚΗ

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

The Learning Outcomes of this course corresponding to Level 7, comprise the following:

- 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

In particular, upon completion, it aims to provide students with the following:

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 though 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	***Teaching Method*** — ***Semester Workload*** Lectures — 52 Laboratory work — 32 Writing an essay — 16 Personal (to each student) time for studying — 75 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit)** — **175**
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

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

COURSE DESCRIPTION: **TOXICOLOGY**
COURSE CODE: **PHA-D24-NEW**

TOXICOLOGY
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-D24-NEW**	**SEMESTER OF STUDIES**	**8th**
COURSE TITLE	TOXICOLOGY		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	4	5
Tutorials	1	

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-D24-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes

In general, this class ambitions to facilitate the acquisition of knowledge, skills and capabilities at the level 6 of the European Framework of Skills of Lifelong Learning. In particular, it aims to provide students with the following:

1. To acquire a demonstrable knowledge and understanding of elements in the field of Toxicology and of the action of Xenobiotics in humans, supported by the use of textbooks of advanced level and by additional data derived from recent developments at the forefront of this field.
2. Grasp the chemical, cellular and functional basis of toxicity, as well as the basis for antidote use and toxicity treatment, when this is available and indicated
3. Be able to use the acquired knowledge and understanding 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. Pharmacology, Biochemistry, Physiology)
4. Be able to synthesize and communicate information and advice on problems of intoxication (poisoning)
5. Be able to approach complex novel problems related to poisoning and suggest diagnosis, solutions and treatment
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 • Respect for natural environment • Develop critical though towards others and themselves • Development of free, creative and inductive thinking

3. **COURSE CONTENT**

Introduction - Basic notions of Toxicology
Risk assessment
Absorbance, Distribution, Metabolism and Excretion
Clinical symptoms – Treatment of poisoning
Mechanisms of Toxicity
Toxic responses of the CNS
Toxic responses of the Cardiovascular system and Blood
Toxic responses of the Respiratory system
Toxic responses of the Liver, GI and Reproductive systems
Toxic responses of the Urinary system and the Kidneys
Chemical Carcinogenesis
Toxicology of organic solvents, alcohols and other industrial chemicals
Toxicology of Metals
Toxicology of Plant and Animal toxins
Toxicology of Pesticides
Toxicology of household chemicals – Antiseptics, Disinfectants
Environmental Toxicology (mostly toxic gases)
Toxicology of pharmaceutical products
Toxic drug-drug interactions
Selective antidotes
Food Toxicology
Environmental pollutants – Air pollution

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	
Teaching organization	***Teaching Method***	***Semester Workload***
	Lectures	52
	Tutorials	13
	Autonomous study	60
	Total number of hours for the Course **(25 hours of work-load per ECTS credit)**	**125**

STUDENT ASSESSMENT	Evaluation done in greek Written exam: • Multiple choice questions • Pairing Qs, and Qs requiring brief reasoning and justification • 100% of the final grade

5. RECOMMENDED LITERATURE

Suggested Books:
Essentials of Toxicology, 2013 (translated in greek)
ΒΑΣΙΚΗ ΤΟΞΙΚΟΛΟΓΙΑ, C. Klaasen, J. Watkins, 2013, Εκδ. Παρισιάνου
ΤΟΞΙΚΟΛΟΓΙΑ (επίτομο), Α. Κουτσελίνης, 2004, Εκδ. Παρισιάνου

Suggested Scientific Journals:
Annual Review of Pharmacology and Toxicology
Critical Reviews in Toxicology

Web Sources:
https://www.epa.gov/
http://monographs.iarc.fr/
https://www.atsdr.cdc.gov/substances/indexAZ.asp#I
https://ntp.niehs.nih.gov/pubhealth/roc/index-1.html

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

COURSE DESCRIPTION: **MEDICINAL CHEMISTRY III**
COURSE CODE: **PHA-D25-NEW**

MEDICINAL CHEMISTRY III
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-D25-NEW**	**SEMESTER OF STUDIES**	**8th**
COURSE TITLE	MEDICINAL CHEMISTRY III		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	5	8
Tutorias	1	
Laboratory practice	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-D25-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes
This course aims at acquiring knowledge, skills and competences related to Level 6 of the European Qualifications Framework for Lifelong Learning. In particular, the present course aims to introduce students to the field of Medicinal Chemistry, which is related with the discovery, development, identification and synthesis of new bioactive compounds, the study of their metabolism, the interpretation of their mode of action at the molecular level and the construction of structure-activity relationships. Upon successful completion of the course: 1. They will have valid knowledge and comprehension of fundamental principles about the discovery and development of new bioactive molecules, which can be used either as therapeutic agents or as chemical biology tools. 2. They will have comprehended how the structural features and physicochemical properties of the new compounds influence their pharmacodynamics and pharmacokinetics. 3. They will have valid knowledge and comprehension of the current approaches applied in the targeted design and discovery of new lead compounds based on the related molecular target information.

4. They will be able to combine and apply the acquired knowledge for solving problems related to molecular design of new candidate bioactive molecules against molecular targets (enzymes, receptors).
5. They will be also able to suggest structural modifications of the new compounds in the context of structure-activity relationship studies for optimizing their pharmacodynamics and pharmacokinetics.
6. They will have valid knowledge and comprehension of the discovery, design, synthesis, metabolism and molecular mode of action of already known therapeutic agents.
7. They will have valid knowledge and comprehension of recent medicinal chemistry research topics, published in relevant textbook and scientific journals.
8. They will have acquired abilities to understand and solve interdisciplinary problems that involve medicinal chemistry issues.
9. They will have developed study skills necessary for their further scientific training and professional development.

General Abilities

- Data and information searching, analysis and combination, using the necessary technologies
- Independent work
- Team-work
- Work in an international environment
- Work in an interdisciplinary environment
- Generation of new research ideas

3. **COURSE CONTENT**

Lectures-Tutorials

- Alkylating agents as Anticancer Drugs
- Anti-metabolites
- Anticancer Antibiotics
- DNA Crosslinking and Intrecalating Antitumor Drugs
- Antimicrobials
- Antiinflammatory drugs
- Antileprosy drugs
- Antifungals
- Antivirals
- Vitamins
- Pathological Avitaminosis - Abuse & Hypervitaminosis
- Drugs against megaloblastic anaemias

Laboratory training

- Determination of the oil-water partition coefficient of mandelic acid
- Determination of hydrophobic stable sulfonamides by reversed-phase thin layer chromatography
- Analysis of (RS) -ibuprofen and (S) -ibuprofen by formation of diastereomeric derivatives
- Determination of ascorbic acid
- Determination of the concentration of a sugar solution
- Determination of the salicylic acid concentration in aspirin samples by formation of Fe(III) complexes.

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	Face to face.
Use of information and communication technologies	∞ Teaching and learning processes are supported by the Upatras e-class platform. The teaching material (lectures, tutorials, laboratory experimental protocols) is uploaded and stored on the e-class and it is freely accessible to all students. ∞ Teaching process is supported by Information and Communication Technologies (ICTs).
Teaching organization	***Teaching Method*** — ***Semester Workload*** Lectures 65 Tutorials 13 Laboratory work 52 Unsupervised study 70 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit) 200**
STUDENT ASSESSMENT	Assessment language: Greek Lectures-Tutorials • Written exams: Multiple choice questions, short answer questions, matching questions and problem solving (70% of the final grade). Laboratory Course • Oral and written tests during the laboratory sessions, individual and teamwork laboratory projects and final written exams (multiple choice questions, problem solving) (30% of the final grade).

5. RECOMMENDED LITERATURE

Suggested Books:

1. Graham L. Patrick, "*An Introduction to Medicinal Chemistry*", 5th Edition, Oxford University Press, 2013.
2. Thomas L. Lemke, David A. Williams, "*Foye's Principles of Medicinal Chemistry*", 7th Edition, Lippincott Williams and Wilkins, 2012.
3. Richard B. Silverman, "*The Organic Chemistry of Drug Design and Drug Action*", 3rd Edition Academic Press, 2014.
4. Gareth Thomas, "*Medicinal Chemistry: An Introduction*", 2nd Edition, Wiley, 2008.
5. Lecture Notes on Medicinal Chemistry III, by Plato Magriotis & George Pairas, Patras 2019

Scientific Journals:

Journal of Medicinal Chemistry
ACS Medicinal Chemistry Letters
European Journal of Medicinal Chemistry
ChemBioChem, ChemMedChem
Bioorganic and Medicinal Chemistry
Bioorganic and Medicinal Chemistry Letters
Angewandte Chemie International Edition
Medicinal Research Reviews

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

COURSE DESCRIPTION: **DIPLOMA THESIS I**
COURSE CODE: **PHA-E11-NEW**

DIPLOMA THESIS I
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-E11-NEW**	**SEMESTER OF STUDIES**	**9th**
COURSE TITLE	DIPLOMA THESIS I		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
-	-	15

COURSE TYPE	Skills Development
PREREQUISITE COURSES:	-
TEACHING AND ASSESSMENT LANGUAGE:	Greek [in English to Erasmus+ Students]
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes [after agreement with a Faculty Member]
COURSE WEBPAGE (URL)	http://www.pharmacy.upatras.gr/images/DS/PHA-E11-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes

The Learning Outcomes of this course corresponding to Level 7, comprise the following:

- Highly specialized knowledge in the field that will be chosen by each student, as a basis for the object of his/hers Diploma Thesis through innovative thinking and research
- Critical understanding of the knowledge status in the selected 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

Specifically, following this course, and according to the specialized field where the investigation is set, the students will be asked to search and select the appropriate methodological approaches, but also to manage them effectively in order to address the distinct research question assigned to them.

The course provides to the students in-depth understanding and familiarization with tools which they will use in their future professional steps, by accessing and utilizing the possibilities and research experience provided by the research structures of the Department, as well as the experience of the Academic Personnel in the particular research subject.

The end result is the enhancement of each student's ability to analyze a scientific question, to become familiar with the respective scientific field, to evaluate experimental and bibliographic data, to propose and/ or apply methodological approaches, and finally to compose pre-existing with new knowledge in order to support specific conclusions.

General Abilities

- Search, analyze and synthesize data and information, using the appropriate technologies and / or laboratory-experimental tools
- Extensive and synthetic use of knowledge and skills offered to him in previous years
- Familiarity with the tools and methodology of the scientific field of the Diploma Thesis
- Practice critical thinking
- Production of new research proposals based on a synthetic knowledge-based approach
- Development of free, creative and inductive thinking
- Strengthening of the student's skills of cooperation and ability for coordinated work within a research team
- Presentation skills and ability to advance arguments on the conclusions of the dissertation
- Work in an international environment.
- Work in an interdisciplinary environment.
- Project design and management.
- Decision making.
- Demonstration of social, professional and moral responsibility and sensitivity.
- Adaptation to new situations
- Decision making
- Autonomous work
- Practice criticism and self-criticism
- Promoting free, creative and inductive thinking

3. COURSE CONTENT

The content of the course is determined by the specific field of study and the research subject given by each supervisor who is also responsible for the assignment of the subject and the monitoring of the progress of each student.

The Department of Pharmacy, based on the research interests of its Faculty and the scientific subjects/fields related to the teaching it provides, enables students to select topics in various specializations throughout the field of Pharmaceutical Sciences.

Indicatively, some basic axes are mentioned below:

- Pharmaceutical Chemistry - Pharmacognosy
- Pharmaceutical Technology - Pharmaceutical Analysis
- Pharmacology - Molecular Biology - Pharmacogenomics
- Pharmacoeconomics

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	The training of students is done face to face and in collaboration with the supervisor, while the assistance of postgraduate students (especially in experimentation-based Diploma Theses) is always constructive and is expected.

Use of information and communication technologies	Whenever required, information and communication technologies will used, e.g. via E-class or Skype-for-Business.
Teaching organization	***Teaching Method*** ***Semester Workload*** Preparation of the Diploma Thesis 375 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit)** **375**
STUDENT ASSESSMENT	Students are evaluated by the supervisor throughout the preparation of their Thesis. In addition, in the end they are evaluated on the basis of a written Diploma Thesis dissertation which they submit and a presentation of the outcomes of their work before a three-member examination committee. The evaluation criteria are explicitly defined by the regulations approved by the Department.

5. RECOMMENDED LITERATURE

Bibliographical sources and scientific magazines used will vary from case to case depending on the nature of the work to be performed or undertaken by the trainee student.

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

COURSE DESCRIPTION: **BASIC PRINCIPLES OF NUCLEAR PHARMACY & RADIOPHARMACY**

COURSE CODE: **PHA-E12-NEW**

BASIC PRINCIPLES OF NUCLEAR PHARMACY AND RADIOPHARMACY
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-E12-NEW**	**SEMESTER OF STUDIES**	**9th**
COURSE TITLE	BASIC PRINCIPLES OF NUCLEAR PHARMACY AND RADIOPHARMACY		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	3	3
Tutorials	1	

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-E12-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes

The Learning Outcomes of this course corresponding to Level 7, comprise the following:

- Highly specialized knowledge, some of it cutting-edge in the fields of Nuclear Pharmacy and Radiopharmacy, as a base for innovative thinking and research
- Critical understanding of the knowledge status in these fields and their 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 fields

Specifically, the lessons aim to understanding a) the basic characteristics of radionuclides and the mechanisms of radioactive decay, b) the basic characteristics of radiation α, β and γ, their interaction with matter and the biological risk from external and internal exposure in radiation and c) in the radiation measurement, the principles and characteristics of radiation counters and the methods of radiation measurements in biological samples (dry and wet techniques).

In the second part the physical, chemical and biological properties of basic radioisotopes/radionucleotides which are used in nuclear medicine are analysed. Methods of preparation and Clinical applications as therapeutics and/or diagnostics.

In the third part ways to produce radioisotopes in large and small scale are presented, as well as methods for protection and monitoring of exposure to radiation.
General Abilities
1. Self-study 2. Work in inter σε interdisciplinary environment 3. Adapt to new situations 4. Search, analysis and synthesis of information

3. **COURSE CONTENT**

1. Structure of matter
2. Radioactive decay (classification of radionuclides, mechanisms of decay, kinetic, half-time)
3. Basic characteristics of radiations (α, β, γ, Xray) and their interaction with matter
4. Radiation measurement
5. Quality control
6. Characteristics of basic radionucleotides used in medicine [Tc, J, Ga, In, Xe, Kr, Tl, F, Co, Hg, Cr, Sr, Fe, Se, Yb, Ir, Au, P, Y]
7. In vitro radioanalytical methods
8. Exposure (ways) and biological results of Radiation
9. Fundamentals of Protection from Radiation
10. Sources and Production of radioisotopes
11. Nuclear Reactor, Cyclotron, and Radioisotope Generators

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	In the class	
Use of information and communication technologies	Support of learning process through the online platform e-class	
Teaching organization	***Teaching Method***	***Semester Workload***
	Lectures	39
	Tutorial	13
	Autonomous study	23
	Total number of hours for the Course	
	(25 hours of work-load per ECTS credit)	**75**
STUDENT ASSESSMENT	Final written examination including: • Questions requiring short answers/comments • Judgment questions	

5. RECOMMENDED LITERATURE

1. Chiotellis Efstratios, Radiopharmaceutical Chemistry, Publisher SIMONI Olga, 75th edition, 2004 (in Greek)
2. Papastefanou Konstantinos, Radiation Physics and Applications of Radioisotopes, Publisher ZITI Pelagia & Co, 4th edition, 2014 (in Greek)
3. Gopal B. Saha, Fundamentals of Nuclear Pharmacy, Springer, 5th edition, 2003

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

COURSE DESCRIPTION: **PHARMACEUTICAL PRACTICE**
COURSE CODE: **PHA-E13-NEW**

PHARMACEUTICAL PRACTICE
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-E13-NEW**	**SEMESTER OF STUDIES**	**9th**
COURSE TITLE	PHARMACEUTICAL PRACTICE		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Laboratory Course (Training in Pharmacies open to the public, Hospital Pharmacies, Pharmaceutical Industries)	15	10

COURSE TYPE	Skills Development
PREREQUISITE COURSES:	-
TEACHING AND ASSESSMENT LANGUAGE:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Not offered
COURSE WEBPAGE (URL)	http://www.pharmacy.upatras.gr/images/DS/PHA-E13-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes
This course aims at acquiring knowledge, skills and competences related to Level 6 of the European Qualifications Framework for Lifelong Learning. In particular, the course aims to familiarize students with three of the most important working environments in which a pharmacist will be called upon to practice his / her science and, in particular, the community pharmacy, the hospital pharmacy and the pharmaceutical industry, as well as the acquisition of knowledge related to their organization, administration and operation. Upon successful completion of the course, the students will: 1. have proven knowledge and they will be able to understand the specificities of each workplace and the parameters related to the case-by-case practice of pharmaceutical science. 2. have acquired the experience of contacting the client/patient and have understood the specificity of the relationship developed during the practice of the Pharmacist in a (community) pharmacy open to the public. 3. have realized that as health scientists they should have the knowledge and skills to be able to provide health services. 4. have learned to exchange information and knowledge with other health-scientists, especially in the field of the hospital pharmacy

5. have knowledge of the pharmaceutical industry and the different fields in which a pharmacist can be involved, take up and handle scientifically and professionally, such as management, scientific support, production, quality control, marketing etc. 6. have developed study and perception skills, necessary for their further scientific lifelong training and professional maturity.
General Abilities
• Data and information retrieval, analysis and combination, using the necessary technologies • Independent work • Team-work • Decision making • Work in an international environment • Work in an interdisciplinary environment • Generation of new research ideas • Promotion of free, creative and inductive thinking

3. COURSE CONTENT

Training in Pharmacies Open to the Public
- Modern Pharmacy Organization
- Pharmaceutical Marketing Information

Training in Hospital Pharmacies
- Particularities of the Hospital Pharmacy
- Issuance and Use of Para-pharmaceuticals
- Fully Hospitalled Pharmaceuticals
- Relationship of the Hospital Pharmacy with other Hospital Units (Labs, Clinics, etc.)

Training in Pharmaceutical Industry
- Land Unit Structure
- Organology - Industrial Practices Procedures
- Scaling-Up
- Drugs Production and related Decision-Making processes
- Organization and Operation of Production Lines

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	Face to face.
Use of information and communication technologies	∞ Learning Pharmacy management software ∞ Search techniques for recent data and updates for pharmaceutical products from certified Pharma/Databases (e.g. Medscape) ∞ Familiarization with computer systems related to production and Qualitative and Quantitative control in the Pharmaceutical industry
Teaching organization	***Teaching Method*** ***Semester Workload*** Personal training in the relevant area (community pharmacy, hospital pharmacy, pharmaceutical industry) with lectures and practice 195 Unsupervised study 55 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit)** **250**

STUDENT ASSESSMENT	Assessment language: Greek 1. Assessment of written reports from each workplace (pharmacy, hospital pharmacy, industry). 30% of the final grade 2. Written exams: Multiple choice questions, short answer questions, matching questions, terminology understanding assessment. 70% of the final grade

5. RECOMMENDED LITERATURE

Suggested Books:

- Remington's Pharmaceutical Sciences, 15th edition and later
- Hellenic Pharmacopoeia
- European Pharmacopoeia
- International Pharmacopoeia

Official Websites (information retrieval)

- World Health Organization
- European Medicines Agency
- Food and Drug Administration (US)
- Medscape
- Others (by case study)

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

COURSE DESCRIPTION: **PHARMACO-ECONOMICS**
COURSE CODE: **PHA-E14-NEW**

PHARMACO-ECONOMICS
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-E14-NEW**	**SEMESTER OF STUDIES**	**9th**
COURSE TITLE	PHARMACO-ECONOMICS		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	3	2

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-E14-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes

The Learning Outcomes of this course corresponding to Level 7, comprise the following:

- Highly specialized knowledge, some of it cutting-edge in the field of Pharmaco-economics, 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

Specifically, upon successful completion of the course the student will be able to:

∞ Understand the role of pharmaco-economics in health economics and in particular in making rational and substantiated decisions.
∞ Know basic cost concepts and data collection methods.
∞ Understand and distinguish different methods of economic evaluation.
∞ Know how to apply the different methods of economic analysis for the evaluation of medicines and medical technologies.
∞ Understand the importance of sensitivity analysis and the concept of present value in pharmaco-economic analysis

- ∞ Know the differences between economic analyzes according to the needs of different decision makers and how they can make use of the results of an economic evaluation in practice.
- ∞ Analyze and evaluate methodically the validity of published pharmaco-economic studies.
- ∞ Use the data of pharmaco-economic research in the quality of life assessment
- ∞ Use the results of the therapeutic outcome in the decision-making process
- ∞ Design a basic pharmaco-economic analysis including all relevant parameters

General Abilities

- ∞ Search, analysis and synthesis of data and information, using the necessary technologies
- ∞ Adaptation to new situations
- ∞ Autonomous work
- ∞ Teamwork
- ∞ Decision making
- ∞ Working in an international environment
- ∞ Working in an interdisciplinary environment
- ∞ Criticism and self-criticism
- ∞ Promotion of free, creative and inductive thinking

3. **COURSE CONTENT**

- ∞ Fundamentals of Pharmaco-Economics and Health Economics
- ∞ Stages of pharmacoeconomic analysis
- ∞ Perspective of the study
- ∞ Specifying the alternative interventions
- ∞ Specifying and measuring the results of pharmacoeconomic evaluation
- ∞ Specifying and measuring the cost of pharmacoeconomic evaluation
- ∞ Sensitivity Analysis and Discounting (Present Value)
- ∞ Data sources of pharmacoeconomic evaluation
- ∞ Selection of pharmacoeconomic application strategy
- ∞ Restrictions of pharmacoeconomic evaluations based on RCT
- ∞ Pharmacoeconomic modelling (Basic principles, Model types, Decision Trees, Markov Chains)
- ∞ Cost-of-illness analysis
- ∞ Cost minimization analysis
- ∞ Cost-benefit analysis
- ∞ Cost-effectiveness analysis
- ∞ Cost-utility analysis
- ∞ Measuring health status and health related quality of life
- ∞ Designing and organizing a pharmacoeconomic evaluation
- ∞ Basic principles of designing health outcomes studies
- ∞ Basic statistical methods applied to pharmaco-economic analyses
- ∞ disease Cost analysis
- ∞ Principles and methods of comparaLve benefit-risk assessment
- ∞ Analysis and evaluation of the validity of published pharmaco-economic studies
- ∞ Case-studies

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	Face to face
Use of information and communication technologies	ICT is used for communicating with students and for sharing educational material, mainly through the eclass platform (announcements, lecture slides and additional educational resources, posting and receiving projects and assignments, students groups, for a, email, exercises, glossary, multimedia resources), as well as via typical email.
Teaching organization	***Teaching Method*** — ***Semester Workload*** Lectures — 26 Teamwork for a case study — 10 Unsupervised study — 14 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit)** — **50**
STUDENT ASSESSMENT	I. Written final exam (80%) comprising: ∞ Essay Questions ∞ Short Response Questions ∞ Problem solving II. Presentation of Group Written Assignment (20%)

5. RECOMMENDED LITERATURE

Suggested Literature:

1. Morris S., Devlin N., 2016, Η Οικονομική Ανάλυση στη Φροντίδα Υγείας, BROKEN HILL PUBLISHERS LTD.
2. Drummond M, O'Brien B, Stoddart G, Torrance G, 2002. Μέθοδοι οικονομικής αξιολόγησης των προγραμμάτων υγείας. Αθήνα: Εκδόσεις Κριτική.
3. Κυριόπουλος Γ, Γείτονα Μ, 2008. Τα οικονομικά της υγείας. Εκδόσεις Παπαζήση.
4. Teaching notes as supplementary material. Available at the course's e-class
5. Rascati, K., 2014. Essentials of Pharmacoeconomics. Philadelphia, PA: Lippincott Williams&Wilkins.
6. Arnold, R., 2010 Pharmacoeconomics: From Theory to Practice. CRC Press.

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

COURSE DESCRIPTION: **DIPLOMA THESIS II**
COURSE CODE: **PHA-E21-NEW**

DIPLOMA THESIS II
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-E21-NEW**	**SEMESTER OF STUDIES**	**10th**
COURSE TITLE	DIPLOMA THESIS II		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
-	-	15

COURSE TYPE	Skills Development
PREREQUISITE COURSES:	-
TEACHING AND ASSESSMENT LANGUAGE:	Greek [in English to Erasmus+ Students]
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes [after agreement with a Faculty Member]
COURSE WEBPAGE (URL)	http://www.pharmacy.upatras.gr/images/DS/PHA-E21-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes

The Learning Outcomes of this course corresponding to Level 7, comprise the following:

- Highly specialized knowledge in the field that will be chosen by each student, as a basis for the object of his/hers Diploma Thesis through innovative thinking and research
- Critical understanding of the knowledge status in the selected 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

Specifically, following this course, and according to the specialized field where the investigation is set, the students will be asked to search and select the appropriate methodological approaches, but also to manage them effectively in order to address the distinct research question assigned to them.

The course provides to the students in-depth understanding and familiarization with tools which they will use in their future professional steps, by accessing and utilizing the possibilities and research experience provided by the research structures of the Department, as well as the experience of the Academic Personnel in the particular research subject.

The end result is the enhancement of each student's ability to analyze a scientific question, to become familiar with the respective scientific field, to evaluate experimental and bibliographic data, to propose and/ or apply methodological approaches, and finally to compose pre-existing with new knowledge in order to support specific conclusions.

General Abilities

- Search, analyze and synthesize data and information, using the appropriate technologies and / or laboratory-experimental tools
- Extensive and synthetic use of knowledge and skills offered to him in previous years
- Familiarity with the tools and methodology of the scientific field of the Diploma Thesis
- Practice critical thinking
- Production of new research proposals based on a synthetic knowledge-based approach
- Development of free, creative and inductive thinking
- Strengthening of the student's skills of cooperation and ability for coordinated work within a research team
- Presentation skills and ability to advance arguments on the conclusions of the dissertation
- Work in an international environment.
- Work in an interdisciplinary environment.
- Project design and management.
- Decision making.
- Demonstration of social, professional and moral responsibility and sensitivity.
- Adaptation to new situations
- Decision making
- Autonomous work
- Practice criticism and self-criticism
- Promoting free, creative and inductive thinking

3. COURSE CONTENT

The content of the course is determined by the specific field of study and the research subject given by each supervisor who is also responsible for the assignment of the subject and the monitoring of the progress of each student.

The Department of Pharmacy, based on the research interests of its Faculty and the scientific subjects/fields related to the teaching it provides, enables students to select topics in various specializations throughout the field of Pharmaceutical Sciences.

Indicatively, some basic axes are mentioned below:

- Pharmaceutical Chemistry - Pharmacognosy
- Pharmaceutical Technology - Pharmaceutical Analysis
- Pharmacology - Molecular Biology - Pharmacogenomics
- Pharmacoeconomics

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	The training of students is done face to face and in collaboration with the supervisor, while the assistance of postgraduate students (especially in experimentation-based Diploma Theses) is always constructive and is expected.

Use of information and communication technologies	Whenever required, information and communication technologies will used, e.g. via E-class or Skype-for-Business.
Teaching organization	***Teaching Method*** ***Semester Workload*** Preparation of the Diploma Thesis 375 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit) 375**
STUDENT ASSESSMENT	Students are evaluated by the supervisor throughout the preparation of their Thesis. In addition, in the end they are evaluated on the basis of a written Diploma Thesis dissertation which they submit and a presentation of the outcomes of their work before a three-member examination committee. The evaluation criteria are explicitly defined by the regulations approved by the Department.

5. RECOMMENDED LITERATURE

Bibliographical sources and scientific magazines used will vary from case to case depending on the nature of the work to be performed or undertaken by the trainee student.

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

COURSE DESCRIPTION: **PHARMACEUTICAL CARE**
COURSE CODE: **PHA-E22-NEW**

PHARMACEUTICAL CARE
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-E22-NEW**	**SEMESTER OF STUDIES**	**10th**
COURSE TITLE	PHARMACEUTICAL CARE		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Laboratory Course (Training in Pharmacies open to the public, Obligatory Attendance Lectures and Case Studies)	15	10

COURSE TYPE	Skills Development
PREREQUISITE COURSES:	-
TEACHING AND ASSESSMENT LANGUAGE:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Not offered
COURSE WEBPAGE (URL)	http://www.pharmacy.upatras.gr/images/DS/PHA-E22-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes

The Learning Outcomes of this course corresponding to Level 7, comprise the following:

- Highly specialized knowledge, some of it cutting-edge in the field of Pharmaceutical Care, 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

In particular, the course aims to familiarize students with three of the most important working environments in which a pharmacist will be called upon to practice his / her science and, in particular, the community pharmacy, the hospital pharmacy and the pharmaceutical industry, as well as the acquisition of knowledge related to their organization, administration and operation.

Upon successful completion of the course, the students will:

1. have proven knowledge and they will be able to understand the specificities of each workplace and the parameters related to the case-by-case practice of pharmaceutical science.

2. have acquired the experience of contacting the client/patient and have understood the specificity of the relationship developed during the practice of the Pharmacist in a (community) pharmacy open to the public.
3. have realized that as health scientists they should have the knowledge and skills to be able to provide health services.
4. have learned to exchange information and knowledge with other health-scientists, especially in the field of the hospital pharmacy
5. have knowledge of the pharmaceutical industry and the different fields in which a pharmacist can be involved, take up and handle scientifically and professionally, such as management, scientific support, production, quality control, marketing etc.
6. have developed study and perception skills, necessary for their further scientific lifelong training and professional maturity.
7. In conclusion, they will deal with issues that are directly related to the plethora of their professional choices and will have acquired the knowledge and the best possible preparation for the more effective pursuit of Pharmacy Science.

General Abilities

- Data and information retrieval, analysis and combination, using the necessary technologies
- Independent work
- Team-work
- Decision making
- Work in an international environment
- Work in an interdisciplinary environment
- Generation of new research ideas
- Promotion of free, creative and inductive thinking

3. **COURSE CONTENT**

Obligatory attendance of Seminars by selected professionals, active in the field of Pharmacy, on the following subjects:

- Business Ethics Issues
- Compliance with Security Rules
- Administration of Controlled Prescription Drugs
- Cooperation with Public and Private Institutions and Health care organizations
- Organization of Hospital Pharmacies-Specificities
- Quality Control (Raw Materials- Processes - End-Products)
- Compilation of New Medicines Approvals Folders
- Compilation of Audit Reports
- Approved Drug Production Rules (Good Manufacturing Practice)
- Methods' Validation Verification
- Quality Assurance

Training in Pharmacies Open to the Public

- Recipes (Reading, Recognition, Filling)
- Handling Special Prescription Cases (misdiagnosis, incomplete prescribing)
- Proper Maintenance of the Official Pharmacy Registry
- Interviewing patients/clients – Obtention and analysis of patient health record
- Advising patients/clients
- Emergency Assistance (First Aid) in the Pharmacy Area
- Delivery of vaccines
- Galenic Formulation

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	Face to Face
Use of information and communication technologies	∞ Teaching and Learning processes are supported by the Upatras e-class platform. The teaching material (lectures, tutorials, laboratory experimental protocols) is uploaded and stored on e-class and it is freely accessible by the students. ∞ Teaching process is supported by Information and Communication Technologies (ICTs).
Teaching organization	***Teaching Method*** ***Semester Workload*** Lectures with obligatory attendance; depending on the subject matter, case studies are thoroughly examined and analyzed, giving to the course a lab-seminar character & Personal training in community pharmacies 195 Unsupervised study 55 ***Total number of hours for the Course*** **(25 hours of work-load per ECTS credit) 250**
STUDENT ASSESSMENT	Assessment language: Greek Written exams: Multiple choice questions, short answer questions, matching questions, terminology understanding assessment

5. RECOMMENDED LITERATURE

- ∞ Bassen, A., & Kovacs, A. M. M., «The Corporate Governance of Listed Companies: A Manual for Investors», CFA Institute, 2008.
- ∞ Beardwell, I. & Holden, L., *Human Resource Management: A contemporary approach*, 3d Edition, Pearson Education, Essex, 2001.
- ∞ Belasco, J. A. & Stayer, R. C., *Το πέταγμα του βούβαλου*, Εκδόσεις Κριτική, 1η Έκδοση, 2000.
- ∞ Benchmarking: An International Journal (Previously Benchmarking for Quality Management & Technology).
- ∞ Bernardin, J. & Russel, J., *Human Resource Management, An experiential Approach*, McGraw-Hill Book Co-Singapore, 2nd Edition, 1998.164
- ∞ Blanchard, K., *Πελατομανία*, Εκδόσεις Κλειδάριθμος, 2007.
- ∞ Blanchard, K., *Το μπράβο της Φάλαινας*, Εκδόσεις Κλειδάριθμος, 1η Έκδοση, 1997.
- ∞ Bovée, C. L., Thill, J. V., *Business Communication Today, McGraw-Hill*, 1992.
- ∞ Chan Kim, W., Mauborgne, R., *Η στρατηγική των Γαλάζιων Ωκεανών*, Εκδόσεις Κριτική, 1η Έκδοση, 2006.
- ∞ Cherniss, C. & Goleman, D., *The Emotionally Intelligent Workplace: How to Select For, Measure, and Improve Emotional*
- ∞ *Intelligence in Individuals, Groups, and Organizations*, Jossey-Bass, 2001.
- ∞ Crainer, St., Des Derlove, *Η επιχείρηση στη νέα εποχή*, Εκδόσεις Κριτική, 1η Έκδοση, 2005.
- ∞ De Meyer, A., Dutta, S., Srivastawa, S., *The Bright Stuff, How Innovative People and Technology Can Make the Old Economy New*, Prentice Hall, 2001.
- ∞ Donnellon, A., *Οδήγησε την ομάδα σου στην επιτυχία*, Harvard Business School Press, Εκδόσεις Κριτική, Αθήνα 2007.
- ∞ Forsynth, P., *Πώς να διαχειριστείτε σωστά τον χρόνο σας*, Εκδόσεις Ελευθερουδάκη, 1η Έκδοση, 2007.

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- Grant, R. M., *Contemporary Strategy Analysis, Blackwell Publishing*, 5th edition, 2005.
- Harrison, S., *Handbook of Strategic Management*, Wiley-Blackwell, 2005.
- Harvard Business Review, *Για την Ηγεσία*, Εκδόσεις Κλειδάριθμος, 2003.
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- Maslow, A., *A Theory of Human Motivation*, Paperback, 2013.
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UNIVERSITY OF PATRAS
SCHOOL OF HEALTH SCIENCES
DEPARTMENT OF PHARMACY
UNDERGRADUATE STUDIES' COURSES

COURSE DESCRIPTION: **CHEMISTRY AND TECHNOLOGY OF COSMETICS**
COURSE CODE: **PHA-E23-NEW**

CHEMISTRY AND TECHNOLOGY OF COSMETICS
COURSE DESCRIPTION

1. GENERAL

SCHOOL	HEALTH SCIENCES		
SEPARTMENT	PHARMACY		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	**PHA-E23-NEW**	**SEMESTER OF STUDIES**	**10th**
COURSE TITLE	CHEMISTRY AND TECHNOLOGY OF COSMETICS		

INDEPENDENT TEACHING ACTIVITIES	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures	3	5
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-E23-EN.pdf

2. LEARNING OUTCOMES

Learning Outcomes

The Learning Outcomes of this class corresponding to Level 7 comprise the following:

- Highly specialized knowledge, some of it cutting-edge in the fields of Chemistry and Technology of Cosmetics,
  as a base for innovative thinking and research
- Critical understanding of the knowledge status in these fields and their 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 fields

After the conclusion of the course, the students will:

- ∞ Know the composition of the cosmetic products
- ∞ Comprehend the role of ingredients and the applications of final product
- ∞ Be capable to design new cosmetic products
- ∞ Know the methods to evaluate cosmetics (quality control)
- ∞ Be capable of suggesting the appropriate type of cosmetic product for each particular case and explain the actions and way of use of a cosmetic product

General Abilities
• Self-study • Decision making • Group study • Design and execute research and development projects

3. **COURSE CONTENT**

i. Skin anatomy and physiology
ii. Ingredients of cosmetics
iii. Skin cosmetics
iv. Cosmetics for the eyes and lips
v. Cosmetics for oral cavity
vi. Nail cosmetics
vii. Hair cosmetics
viii. Cosmetics Regulation

4. TEACHING AND LEARNING METHODS - ASSESSMENT

Teaching method	Teaching in Class, e-class exercises, self-study	
Use of information and communication technologies	E-class platform	
Teaching organization	***Teaching Method***	***Semester Workload***
	Lectures	39
	Lectures	18
	E-class exercises	25
	Unsupervised study	43
	Total number of hours for the Course **(25 hours of work-load per ECTS credit)**	**125**
STUDENT ASSESSMENT	Assessment Language: Greek - Written exams - Essays - Exercises Final Grade: performance in written exam (students can see their exam note book and discuss the evaluation with the tutors)	

5. RECOMMENDED LITERATURE

Suggested Books:

1. Cosmetology, George Papaioannou (Isbn: 9780003406009)
2.Cosmetics-Ingredients and Applications K. Moulopoulou-Karakitsou, D. Rigopoulos (Isbn: 960-7308-87-5)
3. Cosmetology, Vegos Anagnostis (ISBN: 960-390-131-8)
4. T. Mitsui (Editor) New Cosmetic Science, Elsevier, 1997.

Suggested Literature:

International Journal Of Cosmetics Science (Wiley)
Cosmetics (Jacs)
International Journal Of Research In Cosmetic Science (Urp)