COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF SCIENCES		
DEPARTMENT	DEPARTMENT OF CHEMISTRY		
LEVEL OF STUDIES	ISCED level 6 – Bachelor's or equivalent level		
COURSE CODE	EN6	**SEMESTER**	7th or 8th
COURSE TITLE	Pharmaceutical Chemistry		

TEACHING ACTIVITIES *If the ECTS Credits are distributed in distinct parts of the course e.g. lectures, labs etc. If the ECTS Credits are awarded to the whole course, then please indicate the teaching hours per week and the corresponding ECTS Credits.*	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Theory	3	3
Please, add lines if necessary. Teaching methods and organization of the course are described in section 4.		

COURSE TYPE *Background, General Knowledge, Scientific Area, Skill Development*	Specialized Background Knowledge, Scientific Specialization, Skills Development
PREREQUISITES:	NO
TEACHING & EXAMINATION LANGUAGE:	ENGLISH-GREEK
COURSE OFFERED TO ERASMUS STUDENTS:	NO
COURSE URL:	https://eclass2.emt.duth.gr/courses/CHEM-N1105/

(2) LEARNING OUTCOMES

Learning Outcomes
Please describe the learning outcomes of the course: Knowledge, skills and abilities acquired after the successful completion of the course.

The course aims to introduce students to the fundamental concepts of Pharmaceutical Chemistry.
Upon successful completion of the course, students will have acquired the following skills and competencies:

1. To understand the fundamental principles of drugs and drug targets.
2. To understand the concept of drug targets (protein structure and function; enzymes: structure and function; receptors: structure and function; receptors and signal transduction; nucleic acids: structure and function).
3. To understand the principles of pharmacodynamics and pharmacokinetics (enzymes as drug targets; receptors as drug targets; nucleic acids as drug targets; other drug targets; pharmacokinetics and related topics) through the study of representative case studies (e.g., statins).
4. To understand the concepts of drug discovery, design and development (drug discovery: identification of lead compounds; drug design: optimisation of target interactions; drug design: optimisation of target accessibility; the pathway to regulatory approval of a medicinal product) through the study of representative case studies (e.g., Case Study 2: Design of angiotensin-converting enzyme (ACE) inhibitors; Case Study 3: Artemisinin and related antimalarial drugs; Case Study 4: Design of oxamniquine).
5. To understand the tools of pharmaceutical chemistry used in drug discovery and design (combinatorial and parallel synthesis; computational medicinal chemistry; quantitative structure–activity relationships, QSAR) through the study of representative case studies (e.g., design of a thymidylate synthase inhibitor).

6. To gain insight into selected topics in pharmaceutical chemistry (antibacterial drugs; antiviral drugs; anticancer drugs; cholinergic agonists, anticholinergic agents and acetylcholinesterase inhibitors; drugs acting on the adrenergic nervous system; opioid analgesics; antiulcer drugs; cardiovascular drugs) through the study of representative case studies, including Case Study 6: Steroidal anti-inflammatory agents; Case Study 7: Current research on antidepressant agents; Case Study 8: Design and development of aliskiren; Case Study 9: Factor Xa inhibitors; and Case Study 10: Reversible inhibitors of the HCV NS3/4A protease.

General Skills

Name the desirable general skills upon successful completion of the module

Search, analysis and synthesis of data and information,
ICT Use
Adaptation to new situations
Decision making
Autonomous work
Teamwork
Working in an international environment
Working in an interdisciplinary environment
Production of new research ideas
Project design and management
Equity and Inclusion
Respect for the natural environment
Sustainability
Demonstration of social, professional and moral responsibility and sensitivity to gender issues
Critical thinking
Promoting free, creative and inductive reasoning

Upon successful completion of this course, students will have further developed the following skills and competencies:

1. The ability to demonstrate knowledge and understanding of the essential facts, concepts, theories, and applications related to Pharmaceutical Chemistry.
2. The ability to apply such knowledge and understanding to the solution of unfamiliar problems.
3. The ability to adopt and apply appropriate methodologies for solving unfamiliar problems.
4. Study skills required for continuing professional development.
5. The ability to interact effectively with others in addressing interdisciplinary problems.

More generally, upon successful completion of the course, students will have further developed the following generic competencies:

- Search for, analysis and synthesis of data and information, using the necessary technologies.
- Adaptation to new situations.
- Decision-making.
- Autonomous work.
- Teamwork.
- Exercise of critical thinking and self-criticism.
- Respect for the natural environment.
- Promotion of free, creative and inductive thinking.

(3) COURSE CONTENT

THEORY

1. Drugs and Drug Targets: An Overview.
2. Drug Targets: Protein Structure and Function – Enzymes: Structure and Function – Receptors: Structure and Function – Receptors and Signal Transduction – Nucleic Acids: Structure and Function.
3. Pharmacodynamics and Pharmacokinetics: Enzymes as Drug Targets – Receptors as Drug Targets – Nucleic Acids as Drug Targets – Miscellaneous Drug Targets – Pharmacokinetics and Related Topics – Case Study 1: Statins.
4. Drug Discovery, Design and Development: Drug Discovery: Lead Compound Identification – Drug Design: Optimisation of Target Interactions – Drug Design: Optimisation of Target Accessibility – The Pathway to Regulatory Approval of a Medicinal Product – Case Study 2: Design of Angiotensin-Converting Enzyme (ACE) Inhibitors – Case Study 3: Artemisinin and Related Antimalarial Drugs – Case Study 4: Design of Oxamniquine.
5. Tools for Drug Discovery and Design: Combinatorial and Parallel Synthesis – Computational Medicinal Chemistry – Quantitative Structure–Activity Relationships (QSAR) – Case Study 5: Design of a Thymidylate Synthase Inhibitor.
6. Selected Topics in Pharmaceutical Chemistry: Antibacterial Drugs – Antiviral Drugs – Anticancer Drugs – Cholinergic Agents, Anticholinergic Agents and Acetylcholinesterase Inhibitors – Drugs

Acting on the Adrenergic Nervous System – Opioid Analgesics – Antiulcer Drugs – Cardiovascular Drugs – Case Study 6: Steroidal Anti-inflammatory Agents – Case Study 7: Current Research on Antidepressant Agents – Case Study 8: Design and Development of Aliskiren – Case Study 9: Factor Xa Inhibitors – Case Study 10: Reversible Inhibitors of the HCV NS3/4A Protease.

(4) LEARNING & TEACHING METHODS - EVALUATION

TEACHING METHOD *Face to face, Distance learning, etc.*	Face to face
USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY (ICT) *Use of ICT in Teaching, in Laboratory Education, in Communication with students*	Use of ICT in Teaching Use of ICT in Communication with students
TEACHING ORGANIZATION *The ways and methods of teaching are described in detail.* *Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliographic research & analysis, Tutoring, Internship (Placement), Clinical Exercise, Art Workshop, Interactive learning, Study visits, Study / creation, project, creation, project. Etc.* *The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards.*	**Activity** / **Workload/semester** Lectures: 39 Independent Study and Literature Review: 25 Assignment Preparation: 28 Interactive Teaching: 13 Total Course Workload: 105 hours/semester
STUDENT EVALUATION *Description of the evaluation process* *Assessment Language, Assessment Methods, Formative or Concluding, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Essay / Report, Oral Exam, Presentation in audience, Laboratory Report, Clinical examination of a patient, Artistic interpretation, Other/Others* *Please indicate all relevant information about the course assessment and how students are informed*	• Written examinations (mid-term and final examination). • Assessment of assignments. • Evaluation of assignments completed within the framework of interactive teaching activities.

(5) SUGGESTED BIBLIOGRAPHY

Recommended Bibliography

1. Patrick, G.L. Medicinal Chemistry. Greek Edition, edited by G. Rassias, D. Fokas, D. Papagiannopoulou, and E. Pontiki. Kritiki Publications, Athens, Greece, 2021. (in Greek)
2. Selected scientific papers and review articles covering topics of general interest and recent developments in Pharmaceutical Chemistry, Medicinal Chemistry, Biochemistry, and related biological sciences. As is common in rapidly evolving scientific fields, recent advances may not yet be incorporated into textbooks. These materials are updated periodically and made available through the e-Class platform.

Relevant Scientific Journals

- Pharmaceuticals
- Pharmaceutical Chemistry Journal
- Prostaglandins & Other Lipid Mediators
- International Journal of Molecular Sciences
- Frontiers in Biosciences Landmark- Blood- Blood Reviews
- Mediators of Inflammation
- Life Sciences

- Journal of Inflammation
- Infectious Disorders – Drug Targets
- Journal of Medicinal and Pharmaceutical Chemistry